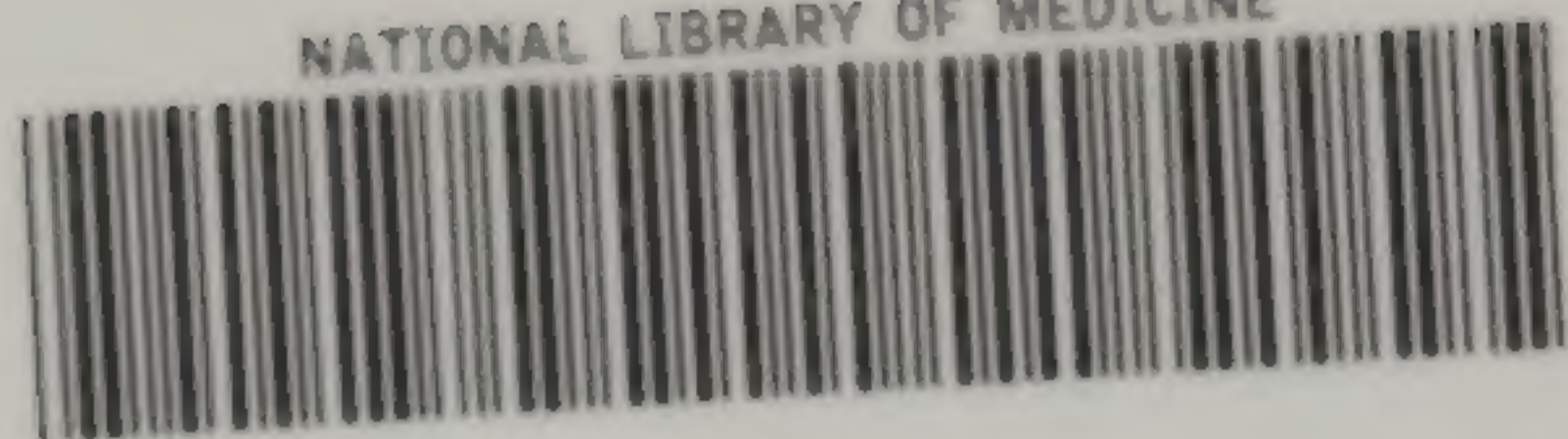


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SYLLABUS

OF THE

LECTURES ON GYNECOLOGY

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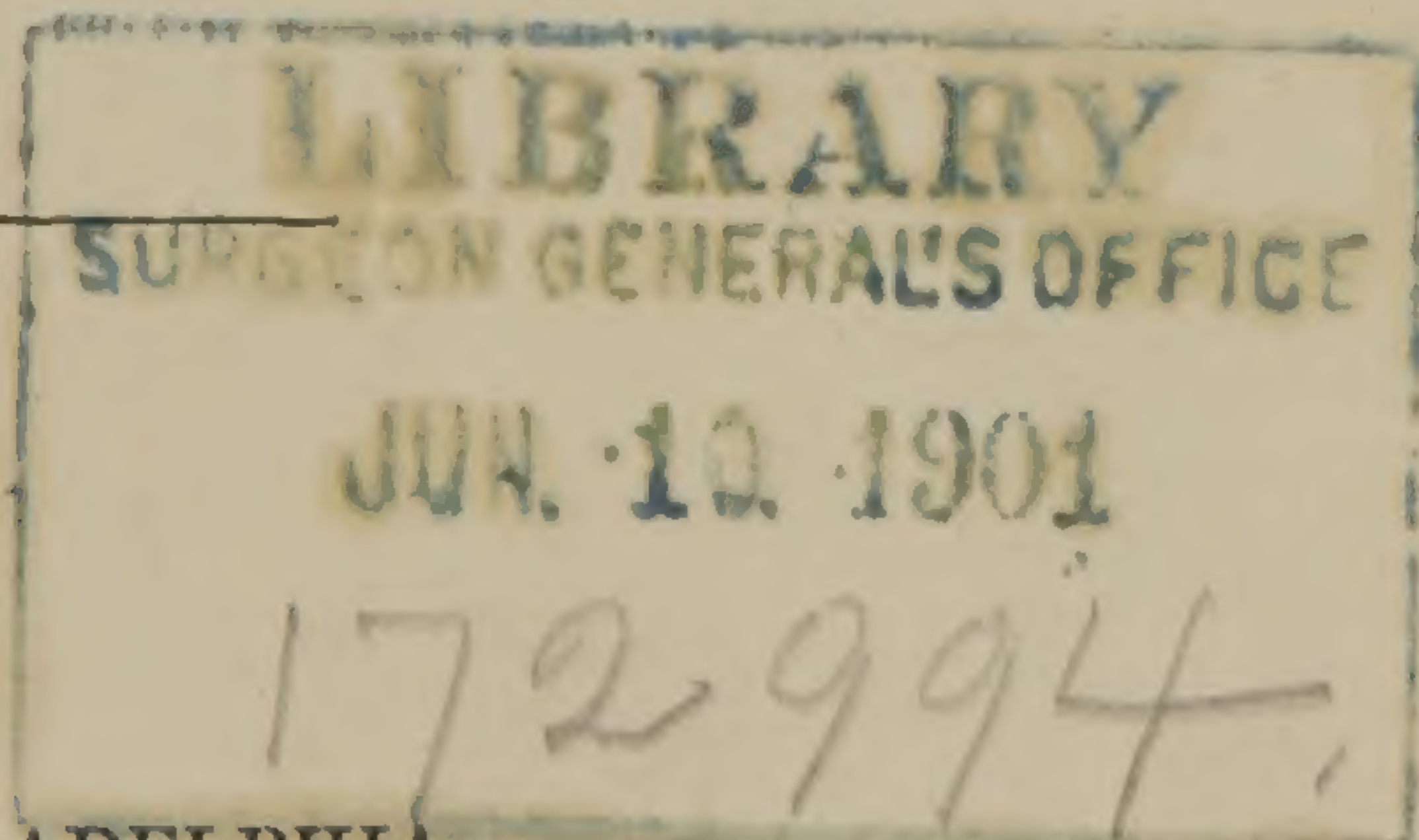
BY

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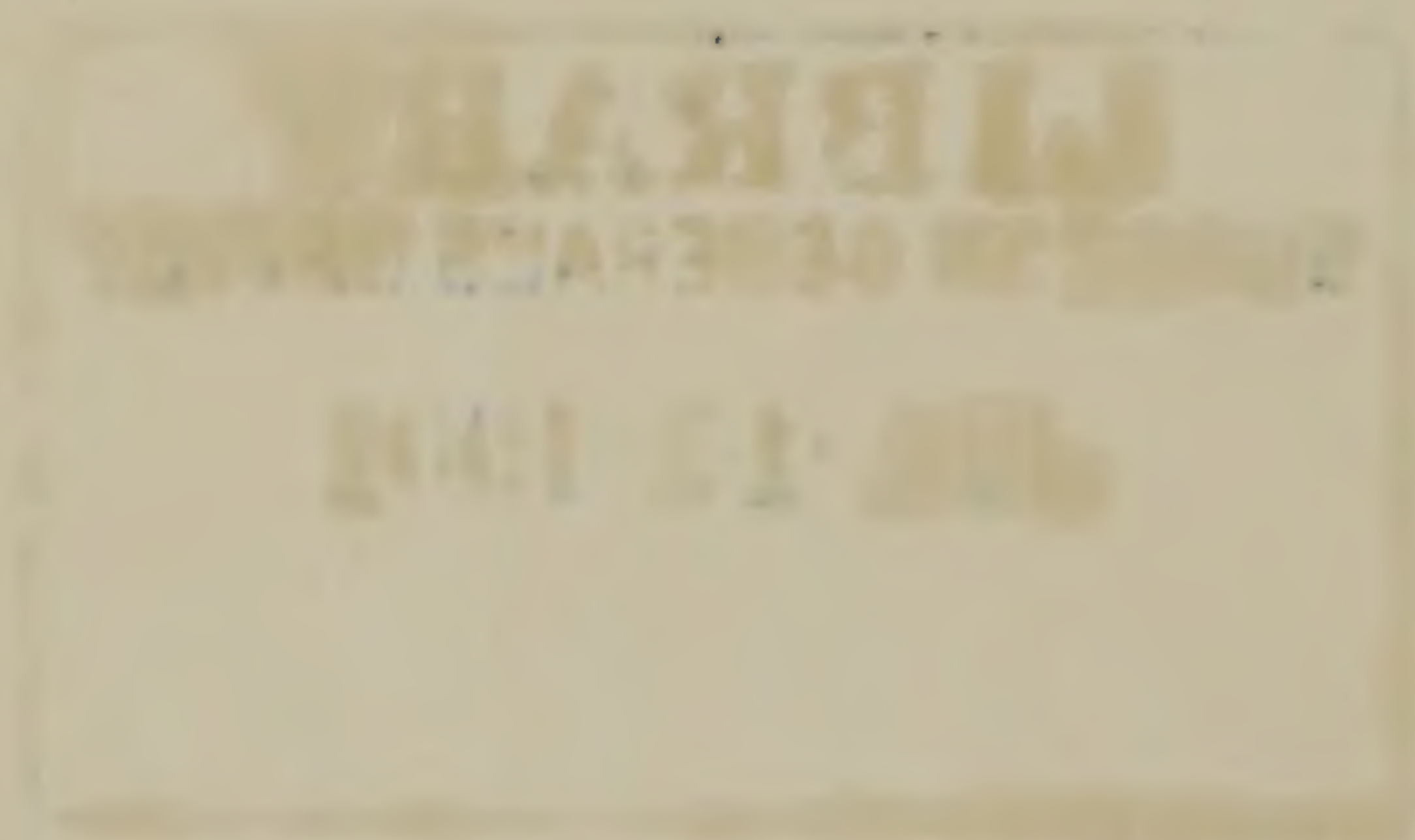
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PREFACE.

With the kind permission of Professor Penrose, whose lectures were placed in the compiler's hands for the purpose, this Syllabus has been prepared for the use of students of the graduating class of the University. It is intended to serve merely as a guide-book, which, by emphasizing the salient points, shall enable the student to more readily follow the course of lectures as delivered during the session. To further facilitate this study a complete index has been appended. The compiler sincerely trusts that experience will prove that the book has satisfactorily met the purpose for which it has been designed.

120 SOUTH SEVENTEENTH STREET, PHILADELPHIA,
September, 1894.

SYLLABUS OF GYNECOLOGY.

I. Methods and Instruments of Gynecological Examination.

POSITION OF PATIENT.—1. The erect. 2. The dorsal. 3. The Sims or latero-abdominal. 4. The genu-pectoral.

Erect position.—The woman separates her legs slightly, while the examiner kneeling on one knee passes his hand beneath her dress and introduces his index finger into the vagina. This position is employed in examination of the pelvic organs, in case of displacement of the uterus, to ascertain the fit of a pessary, or the displacement of the pelvic viscera by any abdominal tumor.

Dorsal position.—The woman lies upon her back with the hips upon the edge of the table. The legs should be flexed on the thighs, and the thighs flexed upon the abdomen, and held in this position by assistants, by foot-rests, or by catching the heels upon the edge of the table. This position is used for examining the abdomen. Examination of the abdominal surface includes inspection, palpation, percussion, and auscultation. The bladder and bowels should be thoroughly emptied. By *inspection* is determined the form, color, equality or inequality of bulge of the abdominal surface, the presence or absence of the linea nigra and linea albicantes. The linea nigra has but little significance; the linea albicantes indicate that the patient's abdomen is or has been distended beyond the normal degree, not necessarily by pregnancy. *Palpation* should be performed with both hands previously warmed to avoid reflex contraction of the recti muscles. It should be begun very gently and the tips of the fingers gradually pressed in with more force for the purpose of deeper exploration. A certain amount of mas-

sage disarms the abdominal muscles, prevents reflex contractions, and permits a satisfactory examination. It should be performed methodically: first the hypogastric region and then the iliac fossæ, determining the amount of alteration in the internal organs, from their normal size and position; then the umbilical, lumbar, epigastric, and hypochondriac regions. If a large body be felt in the abdominal cavity, determine whether it be pelvic or abdominal in origin, by pressing the hand downward just above the symphysis pubis. If pelvic, the hand cannot penetrate deeply because of the pedicle of the tumor. Note carefully the existence or non-existence of intermittent contractions in all tumors of the abdomen. Their presence should raise the suspicion of pregnancy. *Percussion*, made in the usual way, with the patient on her back, right and left sides, and in the sitting position. Changes in percussion note permit of differentiation between encysted and free fluid accumulations. *Auscultation* is performed with the ordinary stethoscope. The fetal heart, uterine souffle, and peritoneal friction-sounds may be heard by it. Uterine souffle and no heart-sounds indicate either pregnancy and a dead child or a fibroid tumor. Ovarian cysts have no souffle. Before finishing the abdominal examination the patient should be made to raise her shoulders by grasping the examiner's hands; when there is no encysted abdominal tumor the recti muscles flatten the abdominal contour; if a tumor be present, the contour is unaltered. An exception to this is in the case of thin-walled cysts that are not tensely filled. A perfectly satisfactory vaginal examination necessitates some kind of examining-table, such as an ordinary kitchen-table with a thin firm mattress, or the upholstered tables of Thomas or Goodell. The latter is 46 inches long, 27 inches wide, 32 inches high at the foot, and 29 inches high at the head.

Dorso-sacral or *lithotomy* position.—The trunk is horizontal, while the pelvis is raised and somewhat flexed upon the vertebral column, and the thighs are strongly flexed upon the abdomen. This affords the most complete relaxation of the abdominal muscles and renders the pelvic organs most accessible. It is used for making a bimanual examination of the pelvic contents. Before making the vaginal

always make a *visual* examination in order to detect any pathological growths, any malformation, tear, discharge, or sore. Specific infection may thus be avoided. There are two places on the hands of the examiner where venereal sores are liable to occur, *viz.*, on the ends of the examining fingers, or on the web between the two knuckles where the hand is pressed against the perineum. One finger is generally sufficient for the purpose of examination, although two may be used if it be necessary; the right hand is preferable for a vaginal examination. *Vaginal examination.*—If practicable, first wash the vulva and douche the vagina. This is not only of advantage to the physician, but it also avoids the danger of carrying septic material from the external genitals and lower vagina to the upper portion of the genital tract. The hands of the examiner should be thoroughly washed and one or two fingers oiled. *Contraindications* to a vaginal examination are virginity, or any acute inflammatory condition of the vagina. In case of rigid hymen, rather than rupture this the examination should be made per rectum. *Order of vaginal examination.* First seek the perineum, pass the finger along the raphé to the fourchette, and thence into the mouth of the vagina. To avoid the clitoris never pass the finger from above downward. If necessary, use sight as well as touch. By the vaginal examination we determine the condition of the ostium vaginae, the presence or absence of a hymen, the smoothness or roughness of the vaginal walls, the state of the cervix, its consistency, form, and direction. *Bimanual examination.*—A combined vaginal and abdominal examination. The finger of the right hand resting on the cervix, the fingers and inner edge of the left hand are placed behind the symphysis pubis at first gently, and gradually sinking deeper into the pelvis. In this way, if the uterus is in its normal position, it can be grasped between the two hands, the fundus being under the abdominal hand and the cervix upon the vaginal finger, and its size, shape, position, and mobility thoroughly mapped out. In a thin woman the normal ovaries may thus be distinctly palpated. If the sensitiveness, cowardice of the patient, or rigidity of the abdominal walls prevents a satisfactory bimanual examination, an anesthetic should be administered. *Rectal examina-*

tion.—Employed in case the vaginal examination is contra-indicated. It is also useful for examining the posterior surface of the uterus; the cervix is caught by a tenaculum and drawn down, the rectal finger reaching as high as the fundus and detecting any irregularity or uterine tumor. This method is also of service in examining prolapsed or diseased ovaries and Fallopian tubes. Simon's method of introducing the whole hand into the rectum is not warranted, and examination through the urethra and bladder is rarely, if ever, necessary.

Sims's or Latero-abdominal position.—One of the most useful positions in operative gynecology. It is the position in which the patient is placed when a Sims speculum is used. The woman lies upon her left side with the left arm behind her, the legs drawn up and the buttocks as near the edge of the table as possible. The right thigh should be a little above and in front of the left, so that the right knee almost touches the table. The object of this position is to allow the intestines to gravitate out of the pelvis. It is employed for making applications to the vaginal vault, the cervix, and the uterine canal, and for many minor gynecological operations.

Genu-pectoral position.—The woman is placed upon her knees, with the knees as near the edge of the table as possible, the *thighs vertical*, and the body resting upon the breast, the head turned to one side on the pillow. This position does all that the Sims position does, and a little more. The intestines gravitate, the pelvis is emptied, and the vagina is ballooned by atmospheric pressure.

INSTRUMENTS FOR EXAMINATION.—*Uterine sound.*—Nothing more nor less than a large surgeon's probe. It is graduated by notches an inch apart, and $2\frac{1}{2}$ inches from the tip is a small bulb that marks the length of a normal uterine cavity. The sound has done much more harm than good in gynecology, and is not used as much as formerly. *Dangers.*—It may produce septicemia and septic peritonitis by the introduction of septic matter; it may perforate the wall of the uterus and produce general peritonitis; or it may produce destruction of the ovum. *Contraindications to its use.*—1. Never pass it as a routine practice, nor unless there is a specific indication—that is, unless it is de-

sired to determine some fact that cannot be determined in any other way. 2. Do not pass it during an ordinary menstrual period. 3. Do not pass it in an acute inflammatory attack of the uterus, ovaries, or pelvic peritoneum. 4. Do not pass it in case of cancer of the cervix or body of the uterus. 5. Do not pass it if a patient has missed a menstrual period. It may be used either with or without a speculum, but always with the most vigorous antiseptics. A vaginal injection and a thorough antiseptic cleansing of the cervix by means of absorbent cotton are necessary preliminaries. Winter has demonstrated the presence of pathogenic germs in the cervix, and without proper precaution these may be carried into the uterine cavity, and give rise to metritis, salpingitis, and so-called perimetritis. *Use of the sound.*—By it may be determined the direction of the uterine axis, the length of the uterine cavity, the presence of intra-uterine tumors, the state of the lining membrane of the uterus, and the patency of the cervical and uterine canals. The light hard rubber or whalebone uterine probe of Thomas is very useful for diagnostic purposes, as there is no danger of injuring the endometrium or uterus by it.

Speculum.—Two recommended: Goodell's bivalve speculum and Sims's duck-bill speculum. The *bivalve speculum* is preferably introduced with the woman in the dorsal position. The labia are separated with two fingers passed just within the vulva. The top of the speculum is pressed downward on the edge of the perineum and guided in toward that portion of the vagina where the cervix has previously been found to lie. The handles are turned toward the left thigh, the blades are opened, and as the os comes into view they are fixed by screws. The *Sims speculum* is employed whenever an ocular examination is made. It exposes to view the whole of the vaginal vault, the vaginal portion of the cervix uteri, and the anterior and lateral walls of the vagina. For making applications of any kind it is the most convenient, and for all operations it is practically the only one that can be used. A useful modification is the instrument with a short shaft between the two blades. If the patient is in the Sims position, a necessary adjunct

to the speculum is a spatula or spoon-shaped instrument to depress the anterior vaginal wall (*Sims's depressor*).

INTRA-UTERINE EXAMINATION.—To make this examination it is necessary to dilate the cervix in order to admit the examiner's finger. This may be done—1. By cutting the cervix; 2. By rapid divulsion; 3. By gradual dilatation with sponge or other tents.

Tents.—The action of tents is based on the fact that they increase in size as they absorb moisture. There are three varieties in general use—the sponge, the tupelo, and the laminaria. The *sponge* tent may be made of any size by saturating the sponge with gum arabic and then compressing it to the necessary size and shape, and allowing it to dry in this form. The *tupelo* tent is made from the root-wood of *Nyssa uniflora*, which can be cut in any size and compressed. It is the best tent, for it can be thoroughly sterilized. It expands rapidly in from four to eight hours, and the danger of producing septic infection is less than with other varieties. All tents, however, are dangerous. The patient's risk increases in proportion to the number of tents used, and it is therefore not advisable to use more than two consecutively unless under special circumstances. The uterine mucosa is a lymphatic surface absorbing most rapidly; sponge tents cannot be inserted with Listerian precautions; hence the danger. The tupelo tent can be sterilized by inclosing it in a small sealed paper envelope, and baking it at a temperature of 250° F., the envelope being opened only at the moment when the tent is to be inserted. *Introduction of tent.*—Best done with the patient in the Sims position. The vagina and cervix are first thoroughly disinfected, the Sims speculum is introduced, the anterior lip of the cervix is grasped by a volsella forceps and drawn down, and the tent, held in forceps, is pressed into the cervix. If it enter but a short distance, allow it to remain for twelve hours, when dilatation will have advanced sufficiently to permit of the full introduction of a second tent. *Rules for introduction of a sponge tent.* 1. No force whatever should be employed. 2. Should the one first tried not pass the os internum easily, it should be at once withdrawn and either bent so as to follow more

accurately the course of the canal, or exchanged for a smaller tent. 3. It should never be introduced at the physician's office and the patient allowed to go home with it *in utero*. 4. Inquiry should be made as to the previous existence of chronic pelvic peritonitis; if discovered, tents must be carefully avoided. 5. A tent should never be allowed to remain in the uterus more than twenty-four hours, and it is best to remove it in twelve hours, if it has accomplished its purpose by that time. 6. Just before and after the removal of a tent, the vagina should be washed out with an antiseptic fluid. 7. After removal of a tent the patient should be kept in bed for at least twenty-four hours, and never be allowed to travel before the expiration of four or five days.

Immediate Progressive Dilatation.—The better method. The best instruments for their purpose are the two dilators of Goodell. After antiseptic precautions they are introduced into the cervical canal, and the latter is rapidly dilated for ten or fifteen minutes. The dilatation should be performed at the woman's home, and preferably under an anesthetic. Any pelvic inflammatory trouble will contraindicate the dilatation. The most convenient position is the dorso-sacral with the perineum retracted with the Sims speculum. The anterior lip of the cervix is seized with a strong tenaculum, the smaller dilator is introduced, and the handles gradually brought together. This should be kept in position for two or three minutes, when it should be withdrawn and replaced by the larger instrument. The handles of this instrument are then slowly pressed or screwed together, often ten or fifteen minutes being needed before full dilatation is produced. An inch and a quarter is sufficient dilatation. The patient should be confined to her bed for at least 48 hours after the operation. Another method is by the use of graduated bougies.

Examination of the uterine cavity.—Made with the finger or curette. With the former are detected the existence of any gross lesion of the uterine wall, and the presence of a polyp or other form of intra-uterine tumor. With the latter a portion of the mucosa may be scraped off

and examined microscopically. The best curette is the dull curette of Thomas.

METHOD OF ANTISEPSIS IN GYNECOLOGICAL WORK.—Three hours before any operation upon the vagina or cervix, the mons veneris and external genitals are thoroughly scrubbed with soap and water by means of a soft brush (jeweler's brush or soft tooth-brush). The vagina is also washed out with soap and water and the brush, or with a dossil of cotton held in forceps. One or two fingers are introduced into the vagina as far as the cervix and the cervix uteri and vaginal fornices are thoroughly cleansed. The soap is washed off with a large douche of hot water. If the external os is patulous, this is also washed out by introducing into it the end of the finger or a small dossil of cotton. This cleansing with soap and water is followed by a douche of two or three quarts of a bichloride solution (1-2000), the bichloride being combined with tartaric acid (5-1000) to prevent the formation of albuminates of mercury. This douche is repeated one hour before operation, and after the second douche a gauze tampon, wet with a 1-2000 bichloride solution, is introduced into the vagina as far as the cervix uteri, and a pad of bichloride gauze is placed over the vulva. This dressing is maintained *in situ* until the patient is placed on the operating-table, when a final bichloride douche is administered immediately before the operation.

II. External Genitalia, Pudendum, or Vulva.

ANATOMY.—The external genitalia comprise the structures known as the *labia majora*, *fourchette*, *labia minora*, *clitoris* with its prepuce, *vestibule*, and *fossa navicularis*. To these may be added the *urethral orifice* (properly belonging to the urinary system), and the *hymen*, which anatomically separates the external genitalia from the vagina.

Labia majora.—Thick folds of hair-covered skin; extend from the symphysis pubis backward between the thighs, meeting each other posteriorly in the median line about one inch in front of the anus. Each has an outer and inner surface. *Structure:* Skin inclosing a quantity

of fat, bloodvessels, and dartos. Superiorly they unite to form the *mons veneris*; inferiorly the *fourchette* or *posterior commissure*, a thin fold of skin.

Labia minora or *Nymphæ*.—Oblique folds of *skin* on the inner surface of each labium majus; very prominent in some African races (*Hottentot apron*). Converge anteriorly and divide into an upper and lower branch. The upper branches unite to form the prepuce of the clitoris, the lower a suspensory ligament. Posteriorly each blends with the labium majus at its middle point. *Structure*: That of true skin.

Clitoris.—Analogue of the penis. Situated in the median line at the apex of the vestibule. *Structure*: two crura arising from the rami of the ischium and pubis, and uniting superiorly to form the body beneath the mucous membrane. The glans alone is visible.

Vestibule.—A triangular smooth mucous surface bounded above by the clitoris, laterally by the labia minora, below by the upper margin of the vaginal orifice. At its base in the median line is the urethral orifice. Ducts of four or five mucous glands open on this surface.

Fossa navicularis.—A ditch-shaped cavity formed by pulling down the fourchette by the finger. *Anterior* boundary, posterior aspect of hymen; *posterior* boundary, inner aspect of fourchette. Normally these boundaries are in contact.

Hymen.—A thin fold of mucous membrane inclosing some connective tissue, bloodvessels and probably nerves. It guards the *vaginal orifice*, which is situated in the median line between the base of the vestibule and the fossa navicularis. It may be entirely absent or exist only as a mere trace. *Varieties*: 1. Cribriform (with a number of small orifices); 2. *Hymen annularis* (one small central opening); 3. *Hymen fimbriatus* (fringed). The presence of the hymen is not a certain indication of virginity, nor is its absence any sign of sexual connection.

Carunculæ myrtiformes.—A number of isolated elevations of mucous tissues about the vaginal orifice. Produced by childbearing, and not by simple laceration of the hymen (*Schræder*).

Glands.—1. *Sebaceous*; 2. *Mucous*. *Sebaceous glands* are abundant in the nymphæ. They furnish a yellowish-white secretion with a peculiar odor, and in women of uncleanly habit this may accumulate in the folds of the nymphæ. *Mucous glands* are of two varieties: (1) the large glands (*vulvo-vaginal* or *glands of Bartholin*); (2) The small glands of the vestibule. The latter are about six in number and are situated about the meatus urinarius. They are compound racemose glands, having small ducts with large orifices. They are mainly important as hiding-places for the gonococcus. *Bartholin's glands* are two in number, the size of a pea, and of a reddish-yellow color. They are situated at the posterior extremity of the bulb, and are partially included in the bulb. They are compound racemose glands, and have ducts over half an inch in length, wide at the base but narrow at the orifice. These ducts run along the inner side of the vaginal bulbs and terminate in front of the hymen about midway between the base of the vestibule and the posterior border of the hymen.

Bulbs of the Vagina.—Small masses of erectile tissue about the size of a bean, lying on either side of the vaginal orifice. Each rests on the triangular ligament and has internally the mucous membrane of the vagina. Anteriorly each bulb blends with its fellow of the opposite side.

RELATIONS IN THE ERECT WOMAN.—In the nude erect female only the mons veneris is seen, and the labia majora and labia minora lie in a plane nearly parallel to the horizon. The well-developed labia majora have their inner surfaces in contact, and are only very slightly separated by the widest divergence of the knees. The labia minora are always in contact. The fossa navicularis only exists when artificially opened up.

DISEASES OF THE PUDENDUM.—1. *Vulvitis.*—Inflammation of the vulva. *Primary* form very rare, if the specific form and the vulvitis of childhood be excluded. Usually it is secondary to and caused by some pre-existing affection, as the discharge from carcinoma, or from a urethral or fecal fistula; it may result from want of cleanliness or from protracted exercise (bicycle-riding), especially in hot weather. *Symptoms.*—In the *acute* stage, swelling of the mucous

membrane around the vaginal orifice and the urethra; occasionally obstruction of the mucous glands with the development of a form of acne; at times inflammation and suppuration of the glands of Bartholin and of the sebaceous glands at the roots of the hair on the labia majora. *Follicular vulvitis* results when the smaller glands of the vulva become specially inflamed. In the *chronic* stage there is abundant secretion of purulent matter. When due to gonorrhea, papillomata or venereal warts may form around the vaginal orifice. Rarely erysipelas and gangrene may result. *Vulvo-vaginitis of children* is not rare and may be supposed to indicate rape because of the inflamed appearance of the vulva and the profuse discharge. It is due to irritation of urine, presence of worms, want of cleanliness, and the strumous diathesis. *Treatment of Vulvitis.*—Cleanliness; separation of the inflamed surfaces. Local applications of boracic acid, 3j to Oj of water, 2 or 3 times in the 24 hours; dusting with subnitrate of bismuth, oxide of zinc, or iodoform; painting with a solution of nitrate of silver, 10 grains to the ounce in the *acute* stage, 40–60 grains to the ounce in the *chronic* stage. After the application, place a pledget of absorbent cotton between the labia to keep the surfaces apart and to absorb the purulent discharge.

2. *Inflammation and Abscess of the Labia Majora.*—Occurs in the connective tissue which constitutes the greater part of the labia, and may go on to suppuration. *Cause.*—It is often associated with vulvitis; may be due to the irritating secretion of the vagina, to blows, or other injuries. *Symptoms and Treatment* are those of inflammation elsewhere. If suppuration should occur, early evacuation is required.

3. *Varicose Veins of the Vulva.*—Commonly occur in those who have borne children, and usually first appear during pregnancy. The varicose condition may be produced by anything that obstructs the venous circulation and increases the intra-venous pressure, as a tumor, or the straining at stool in obstinate constipation (*Winckel*). *Symptoms.*—The patient may not be aware of their presence, or there may be a sense of heat and irritation, with

excessive fulness of the parts. Physical examination reveals a tumor of distended veins varying in size from a slight enlargement to the head of a child. *Treatment*.—Support the mass with a T-bandage; an abdominal corset should be worn to lift the uterus and lessen pressure on the pelvic veins. The clothing should be loose, without constriction about the waist. If occurring during pregnancy, the danger is rupture at the time of delivery. If ordinary treatment will not avail, excise the veins as in the case of varicose veins elsewhere, laying open the labium on its inner surface, and ligating the veins in one or more bunches.

4. *Hematoma of the Labium*.—Incorrectly called hematocele or thrombus of the vulva. It is due to a subcutaneous rupture of a varicose vein in the labium, usually during labor after violent manœuvres, exaggerated efforts, or the sudden issue of the child's head. It is smaller in non-pregnant women, and is due in them to blows or falls. It is usually unilateral, is of a violet color, and may reach the size of the fetal head. It is a very grave complication of parturition. In 120 cases there were 24 deaths (*Girard*). It may rupture with fatal hemorrhage, or it may suppurate and produce septicemia. *Treatment*.—If small, it may be left to nature to absorb, the vagina being kept aseptic; if large, incise the parts about the tumor, clean out the cavity, ligate the bleeding vessels, and pack with iodoform gauze.

5. *Hyperesthesia of the Vulva*.—A rather rare condition, characterized by a supersensitiveness of the vulva, but no pruritus, redness, or other external manifestation. There is extreme pain on handling the part, and sexual intercourse is impossible. This affection must not be confounded with vaginismus or pruritus. It is most apt to occur at the menopause, and may be due to some senile change in the mucous membrane. It occurs usually in women of weak mental and physical powers. *Treatment*.—Unsatisfactory. The sensitive tissue may be dissected off; nitric acid and a four per cent. solution of cocaine may relieve temporarily. Tonics, nutritious food, change of air and scene are best.

6. *Pruritus Vulvæ*.—A symptom rather than a disease. It consists essentially in an irritable condition of the nerves of the vulva, and occasionally of the vagina, anus, integument of the abdomen and thighs. The itching is at first relieved by scratching or rubbing, but later the relief thus afforded is temporary, and scratching even aggravates the trouble, finally giving rise to an eruption of an irritating nature, from which there is an exudation of an irritating character. The suffering becomes at times so intense that the patient seeks relief in anodynes and hypnotics. Pruritus is generally secondary to leucorrhea, the irritating discharges from an ulcerating cancer of the uterus, or the irritation produced by diabetic urine. The leucorrhea of endometritis, cervical or corporeal, is especially prone to give rise to pruritus. It may result from the presence of parasites, or reflexly from other diseases of the uterus or ovaries unconnected with any irritating discharge. *Treatment*.—Always examine carefully for the cause. Ascertain whether sugar be present in the urine. If an endometritis exists, treat this to arrest the irritating discharge. A pledget of absorbent cotton placed against the os to receive the discharge will be of great benefit. Correct displacements of the uterus, or existing disease of the ovaries. Vaginal douches containing acetate of lead, carbolic acid, boracic acid, lead lotion, or the dilute solution of the subacetate of lead may be used. Subnitrate of bismuth may be dusted on to prevent friction of the labia against each other (probably the best local application). An equal quantity of prepared chalk may be added to this. If sugar exists in the urine, carefully dry the vulva after urinating. When no cause can be found the disease is termed *idiopathic pruritus*, and is regarded as a neurosis. The best remedies for such cases are bichloride of mercury, and emulsion of bitter almonds, one grain to the ounce, applied to the parts twice daily; a powder composed of 1 grain of morphine to 2 grains of chalk, to be applied night and morning; equal parts of tinctures of opium, iodine, and aconite (of each ʒv), carbolic acid ʒj, applied once a day. A solution of iodoform in ether applied by an atomizer and blown into all the folds of the mucous

membrane, is of service. The ether soon evaporates and leaves a fine coating of iodoform over the whole surface. Light cauterization with silver-nitrate or strong carbolic solution may be tried; excision of the diseased skin may be successful (*Schræder and Löhlein*). Attention should be paid to the general nutrition of the patient; fish, crustacea, spices, and alcoholic drinks should be avoided. Alkaline water, frequent laxatives, prolonged baths, and the internal administration of arsenic are indicated. If there be a gouty tendency, administer appropriate remedies.

7. *Tumors of the Vulva*.—All rare with the exception of cysts of the Bartholin glands. They are *papilloma*, *elephantiasis*, *neuroma*, *fibroma*, *lipoma*, and *carcinoma*. *Papillomata* are generally of venereal origin, either gonorrheal or syphilitic. They may be due to the leucorrhea of pregnancy. *Elephantiasis* in this country is very rare. The constant and predominant lesion is a wide dilatation of the lymph-vessels. It is syphilitic in this country. *Neuroma* appears in the form of an extremely sensitive red papule. Its most common seat is the urethral orifice. *Carcinoma* of the vulva is rare in comparison with its frequency in the uterus. *Treatment of Tumors of the Vulva*.—Purely surgical—complete extirpation.

8. *Cysts of Bartholin's Glands*.—Lesions of these glands, whether cysts or inflammation, are generally due to gonorrhea. This disease can remain for a long time dormant in the excretory duct of the gland after the vagina is free from it. Suppuration of the duct is the rule in gonorrheal vaginitis. The orifice of the duct is surrounded by a purplish-red areola resembling a flea-bite, and this has been called the "*gonorrheal macule*" by Säger. In cases of gonorrheal vaginitis in which this duct is inflamed, open it with a small knife, and cauterize with nitrate of silver stick or a weak solution of chloride of zinc (1 in 50). *Cysts* are of two kinds; those of the duct, which are more superficial, small, and transparent; and those of the gland. These cysts may be unilocular or multilocular; they are ovoid in shape; and their surface is smooth. The contents are viscous, colorless, or yellow, at times chocolate-colored. The size varies from a nut to an egg, but may become enor-

mous. *Symptoms.*—Discomfort in walking and coitus; tendency to inflammation and suppuration. *Diagnosis.*—Inguinal hernia, hydrocele of the round ligament, and hematoma must be excluded. *Treatment.*—Free incision and packing with iodoform gauze to favor healing by granulation. The better plan is extirpation of the cyst with immediate suture and closure of the wound.

9. *Suppuration of Bartholin's Gland.*—May follow inflammation of a cyst, or be due to gonorrheal or other infection. *Symptoms.*—Great swelling and edema; acute pain, lancinating in character; some fever, and at times retention of urine. Fluctuation on percussion, first apparent on the inner surface of the labium majus. The pus is abundant and often very fetid and may contain the gonococcus. If the abscess has been allowed to evacuate itself, the resulting fistulæ persist for a long time after the inflammation has disappeared, and are obstinate seats of gonorrhea. In the chronic state there may be no signs of inflammation, no tumor, only a small hypertrophic induration of the gland, whose duct gives vent on pressure to a milky or greenish pus which also escapes spontaneously by the fistulous opening. *Treatment.*—Of the *acute* form, free incision at the junction of the skin and mucous surfaces within the free edge of the labium, cleansing with a pure carbolic acid solution, and packing with iodoform gauze. Better plan is extirpation of the whole gland. In the *chronic* cases with fistulous tracts, extirpation of the gland is the only treatment.

III. The Female Perineum.

Also called the *Floor of the Pelvis*, and the *Pelvic diaphragm*.

ANATOMY.—It comprises the tissues which together occupy the space between the bones of the pelvic outlet. It is composed of muscles, fascia, areolar and elastic tissues. Most essential are the muscles, which have their origin from the ischium, pubis, and coccyx, and from these points extend downward, inward, and backward to the median line, and are attached to the latter, to the ends of the rec-

tum and the vagina, and to their fellows of the opposite side. Among them are included the transverse perinei, the bulbo-cavernosus, the erector clitoridis, the sphincter ani, the constrictor vaginae, and the *levator ani*, the latter being the chief muscle and the most important structure of the pelvic diaphragm. It arises from the posterior surface of the os pubis, the pelvic fascia, and the spine of the ischium, and passes downward, backward, and inward to be inserted in the median line, the walls of the vagina and rectum, its fellows of the opposite side, and the end of the coccyx. This muscle covers the whole pelvic floor, and the other structures simply act as supports. The *sphincter ani* muscle, which has a function peculiarly its own, is closely united to all of the remaining muscles of the pelvic floor by the interlacing of the muscular fibres, and by tendinous and fascial attachments. It arises from the tip of the coccyx and surrounds the orifice of the rectum in conjunction with its circular fibers, while some of the deeper fibers are attached to the tissues in the median line between the rectum and vagina. Surrounding the muscles of the pelvic floor is the *pelvic fascia*, deep and superficial, at points ligamentous in character. Thus the *ischio-perineal ligament* is the dense portion of the fascia stretching from one side to the other, through the space between the rectum and vagina. This ligament holds the posterior wall of the vagina in place. The *perineal body*, or *wedge*, so-called, the triangular-shaped body occupying the space between the vagina and the rectum, is not a distinct structure. It is merely a mass of connective tissue, elastic tissue, bloodvessels, fat, muscles, and muscular attachments. This body of itself is of no functional importance. It has no sustaining power to the contents of the female pelvis. Its functional value depends upon the integrity of the muscles that are attached to it or that move it, and it may be injured without seriously interfering with the supporting power of the pelvic floor.

POSITION AND SHAPE OF VAGINA.—The vagina is not an open tube, but simply a split in the floor of the pelvis running at an angle of about 60° to the horizon when the woman is erect. In the nulliparous woman the vagina is

always closed, the anterior and posterior walls being in accurate apposition from the hymen to the cervix. It is only when the fibers of the levator ani muscles are lacerated or paralyzed that the posterior wall of the vagina will fall back, and permit of a gaping of the vaginal orifice.

FUNCTION OF THE PERINEUM.—Best appreciated from studies made upon living subjects—multiparæ, nulliparæ, and virgins. In *nulliparæ*, the gluteal cleft is deep and sharp-angled, the anus appears tucked up under the pubic arch, and the perineum is very small and shallow in every measurement. Bearing-down efforts bring the opposed vaginal walls more closely in contact. The straining force is at right angles to the vaginal slit, and there is no tendency to protrusion of the vaginal structures. Within the vagina just behind the hymen posteriorly may be felt a horizontal band of muscular fibers $\frac{1}{3}$ to $\frac{1}{2}$ inch in breadth, which appears to be in some measure under voluntary control. This, and not the perineal body, is the true and sole support of the vaginal outlet. The diagnosis of injury to the true supporting structures of the vaginal outlet is made by determining the direction of these fibers, which normally is transverse. In prolapsus and relaxation of the outlet their direction is inclined and may be even vertical.

INJURIES TO THE PELVIC FLOOR.—The result of childbirth. The ease with which tears may be produced may be conceived if it be borne in mind that a ring not greater in circumference than from $2\frac{1}{2}$ to 3 inches must in childbirth dilate to one 13 inches in circumference. In order to support the vaginal outlet and prevent hernia of the superimposed structures this must again return to its former size and strength. In case of impairment of this supporting power prolapsus of the pelvic organ will result in time, except in three conditions: 1. *When the injury is compensated for by the muscles that still maintain their attachment to the vagina and rectum.* These draw the remaining portion of the pelvic floor upward, forward, and toward the pubis, thereby closing the vaginal orifice and supporting the pelvic organs; 2. *Where by reason of some intra pelvic inflammation the organs have become fixed by adhesions and consequently are unable to prolapse;* 3.

Where the patient is abundantly supplied with adipose tissue, and takes very little active exercise.

Varieties of Laceration.—1. Slight laceration in the median line. 2. Laceration in the median line involving the sphincter ani. 3. Laceration in either vaginal sulcus involving the muscles. 4. Subcutaneous laceration of the muscles. 5. Atrophy and paralysis from injuries during parturition. 6. Muscular ankylosis, that is, loss of muscular motion caused by the products of a former inflammation. 7. Perforation of the perineum, a very rare tear, the head and body of the child passing through a central rupture that does not communicate with the vaginal or anal orifices. These may be grouped into two general classes, viz.: 1. Those that involve the perineal body; and (2) those that involve the muscles that are attached to and support the perineal body.

Description of Varieties—*Slight laceration in the median line* is merely a tear of the fourchette extending in some instances to the sphincter ani, and practically not involving the vagina. It results in little or no functional disability. The integrity of the muscles is intact, and the normal support is maintained. *Laceration in the median line involving the sphincter ani* results in great disability to the patient, since there is little or no retentive power of the sphincter, and the feces escape involuntarily. There is generally, however, no prolapse of the pelvic contents, for, though the perineal body is split, its muscular attachments remain intact, and it is still able to be drawn forward by these muscles, and so support the posterior vaginal wall. *Laceration in either vaginal sulcus, i. e.,* a tear running to one side toward the tuberosity of the ischium, or in the direction of the ischio-rectal fossa, is generally most extensive on the left side. In many cases, however, both sulci are torn, and in addition there may be a more or less extensive median tear of the skin-perineum. Such a tear separates the fibers of the levator ani muscle from their attachments. Should both sulci be torn, the perineal body and the vaginal and anal orifices are left without any muscular support. The sphincter ani muscle, however, in these lateral tears escapes injury, being pushed aside,

while the tear passes on into the cellular tissue of the pelvic floor. These inside tears of the perineum are frequent, and yield more disastrous results to the woman than the more obvious tears of the skin-perineum. *Subcutaneous laceration of the muscles* results from the different degrees of elasticity of the structures composing the vaginal outlet of the pelvis. The skin and mucous membrane may stretch to a greater extent than the muscular fibers and the fascia, hence a tear may result in the latter and not in the former. This condition is often called *relaxation of the perineum*, and this relaxation is due to destruction of the muscular supports. Prolapse of the pelvic organs eventually follows. *Atrophy and paralysis from injuries received during parturition* may result without any laceration of the muscular fibers, the condition following the long-continued pressure of the fetal head. The resulting phenomena are the same as in the case of relaxation of the perineum. *Muscular ankylosis* must not be confounded with the so-called rigid perineum or vaginismus and spasmodic muscular contraction. It is simply a rigid state of the muscles of the perineum caused by the products of a former inflammation that has impaired the elasticity and motion of the muscles. In such cases the rigidity may be so great that coition is impossible.

Appearance of Perineal Lacerations with Diagnosis.—The appearance differs according to the time after the receipt of the injury at which they are seen. If looked for at once after labor, by elevating the anterior vaginal wall by means of a retractor they may readily be detected, but after the lapse of four or five weeks the tears become skinned over at first by delicate scar-tissue which afterwards contracts, so that a hasty examination may not reveal any tear, or there may be formed a dense and painful cicatrix. Especially may subcutaneous laceration of the muscles be overlooked. In such a case, however, the anal cleft is no longer a sharp deep furrow, but is flat and shallow, and the anus in place of being drawn up under the pubic arch lies flat, exposed, and dropped back. The perineum is actually deeper than normal—instead of being 2 to 3 centimeters in

depth it is now 4 or 5. The powerful ridge of transverse fibers that closes the vaginal outlet can no longer be felt, but they are found hanging at an angle or even vertical at the sides of the vagina. The difference in the external appearance of the perineum is very marked. The skin-perineum is intact, but there is nothing above it and nothing to either side of it. *The efficiency of a perineum not torn on its skin-surface is inversely proportional to its depth.* The very deep perinei are weak, the shallow short ones are strong. In this relaxed perineum no response follows irritation of the labia, nor can the woman voluntarily close the patulous vaginal orifice. The best test of relaxation of the perineum is the *finger-test*. The thumb or index-finger is pressed into the perineum on either side of the fourchette, the fingers are then pushed downward, outward, and backward as if the intention were to carry them under the pubic rami. The outlet will open at once and the vaginal wall roll out in a characteristic manner. In the erect posture the intra-abdominal pressure tends to force the pelvic structures out of the weak outlet, and the actual gap in the support may thus be filled in by prolapsed structures. By placing the woman in the latero-abdominal position, or by thorough etherization, the uselessness of the perineal body may be demonstrated. In exceptional cases in girls of weak delicate fiber the vaginal walls and perineal body may without any assignable cause become extraordinarily relaxed and entirely incapable of performing their functions. In the vast majority of cases, however, such relaxation is due to subcutaneous tear of the muscles during parturition.

Symptoms of Laceration of the Perineum.—Depend to a great extent upon what structures suffer most from the prolapse or loss of support. The *general* symptoms are dragging sensations in the back and hips, pain in the back and ovarian regions, a feeling of loss of support, and of protrusion of the vagina upon any attempt at lifting, straining, or coughing, and a sense of lassitude and inability to work. The recumbent posture always gives relief. *Examination* will reveal one of the conditions described, and on asking

the woman to bear down there will be seen the characteristic rolling out of the posterior and anterior vaginal walls, never observed in health. Cicatrices will probably be discovered in one or both vaginal sulci. Their absence, however, is no proof that the deeper perineal structures have not been injured. The finger test will complete the diagnosis.

Treatment of Lacerations of the Perineum.—*Perineorrhaphy.*—*Object*, restoration of the function of the part.

Varieties of Perineorrhaphy.—1. *Immediate or primary*, done immediately after or within 24 hours after the injury; 2. *Intermediate*, done during the granulation-period; 3. *Secondary*, done after cicatrization is complete.

Immediate or Primary Perineorrhaphy.—To be preferred in all circumstances. *Advantages.*—1. Denudation is already made, and there is no sacrifice of tissue; 2. No anesthetic is required on account of the numbness of the parts; 3. The patient is saved the discomfort and pain of the slow process of granulation, and also the suffering consequent upon neglect of the primary operation; 4. Unless the parts have been greatly contused during labor, immediate union can always be secured; 5. The dangers of sepsis are diminished, since septic processes usually start at a point higher in the genital canal, and the proper closure of the tear shuts off this lower area from the possibility of contamination. *Instruments.*—Elevator for anterior vaginal wall; scissors; needle and needle-holder; silkwormgut, or shot and shot-compressor. The needle should be round and pointed, without a cutting-edge.

Method of passing sutures.—Varies with each patient. For the simplest form of tear they should be passed from the skin surface of the perineum only. They are entered at the skin margin on one side of the wound, swept around rather deeply into the tissues, and out at a point opposite. Considerable tissue should be taken up on either side of the line of laceration to insure perfect approximation along the whole line of the wound. If the tear extends up the posterior vaginal wall, two rows of sutures are required, one upon the vaginal surface, the other upon the skin surface. If there is a tear in each lateral sulcus of the vagina, close first one sulcus, then the other, and finally the outside tear

of the perineum. In closing the sulci the sutures should include considerable tissue under the ramus of the ischium. The needle should be swept far out from the wounded surface, emerge at the bottom of the sulcus, re-enter, pass along the opposite wounded surface, and emerge upon the vaginal mucous membrane. The sutures should be passed in a direction from above downward, *i. e.*, the needle should always pass toward the skin-perineum. There is thus formed in each sulcus a succession of V's, the apices of which are pointing downward toward the skin-perineum. The *object* in passing the sutures downwards is to draw up the tissues of the perineum. The *complete tear involving the sphincter ani* usually does not extend up the recto-vaginal septum very far. Should it do so, the tear in the septum must be closed first, then the ruptured sphincter muscle, and, finally, the laceration of the external perineum. The tear in the recto-vaginal septum may be closed by a row of sutures introduced either from the vagina or from the rectum. They are placed from $\frac{1}{4}$ to $\frac{1}{3}$ inch apart, and if introduced in the vagina may pass through the vaginal mucous membrane, and emerge at the edge of the rectal mucous membrane. In closing the sphincter ani it is of the greatest importance that perfect union of the muscle be secured. The first suture should be passed well behind the sphincter and well in toward the anus, so that it passes through the inner part of the sphincter muscle. It emerges at the apex of the tear, is re-introduced there and passed around, emerging on the skin margin opposite the other end of the torn sphincter. On tightening this suture the anus will appear quite small, and the value of the suture will be shown by the corrugated surface making a complete circle around the small anal orifice. The ends of the torn sphincter muscle may always be recognized by the depression that exists immediately over the ends of the muscular fibres. Avoid using bichloride douches in these cases, for if the fluid enter the rectum fatal poisoning may result.

Local after-treatment.—Slight. Cleanliness and rest. Remove the sutures from 8 to 14 days after operation. The bowels may be moved on the second to the fifth day with saline purgatives (Rochelle salts, 3ss every hour until a

movement has taken place), or by a rectal injection (avoid passing the nozzle of the syringe between the sutures in the perineum). A continuous escape of flatus may be allowed by introducing a soft-rubber catheter into the bowel. This will avoid abdominal distention and tympany. If the discharge from the vagina become offensive and irritating, a douche of carbolic acid, bichloride of mercury, or plain water should be administered. In cases of subcutaneous tear of the muscles support the pelvic floor by means of a compress and bandage fastened to the abdominal binder. The reversed ends of the muscular fibres are thus approximated and union favored. This same support should be continued during convalescence after childbirth. In any severe tear the patient should spend three months in quiet, and should abstain from any lifting or hard work.

Intermediate Perineorrhaphy.—Done in 10 days or 3 weeks after the tear has taken place. Generally an anesthetic is not required, other than a ten per cent. solution of cocaine. *Appearance of Tear.*—Walls of the laceration rigid; area of the tear distinctly mapped out; the lateral walls cupped, and the fourchette replaced by two very prominent pyramidal tips of tissue projecting from the lateral wall toward the median line at the point where the external becomes continuous with the internal laceration. *Method of Operating.*—Remove scar-tissue and granulation-tissue with the curette; wash the raw surface with a fifty per cent. solution of hydrogen peroxide, and then with bichloride of mercury; the sutures are the same as for the primary operation.

Secondary Perineorrhaphy.—Done at a period varying from several months to many years after the injury. Should there be an atrophy of the muscular fibres, the perineum can never be restored to its original functional integrity. *Appearance of Tear.*—Absence of granulation; presence of a linear scar with radiating lines; it is a white line making a distinct break in the natural furrows of the tissue which run to this point, end abruptly, and begin anew on the other side. *Instruments.*—Emmet's right and left scissors curved on the flat; three tenaculi; dissecting-for-

ceps; curved, round, or straight needles without cutting-edge; needle-holder; silkwormgut; perineal cushion; crutch to hold the legs; shot, and shot-compressor. *Preliminary Treatment*.—Thorough evacuation of the bowels by means of Epsom or Rochelle salts, $\frac{1}{2}$ $\bar{3}$, compound licorice powder, or castor oil, following with a rectal injection (soap and water) 2 hours before the operation. *Best Time for Operation*.—One or two weeks after the menstrual period. *Position of Patient*.—In the lithotomy position with the hips upon Kelly's air-cushion, the legs held by the crutch or by two assistants. In making the denudation the mucous membrane is grasped with the dissecting-forceps or tenaculum and clipped off in long strips, care being taken not to leave any portion of the surface undenuded. During the operation use constant irrigation of water, or, less preferably, a sponge. *Methods of Operating*.—1. *Hegar's* or the *Median Operation*.—Consists in a triangular denudation up the posterior wall of the vagina, the base of the triangle being parallel with the lower margin of the vagina, and the apex reaching almost to the cervix, while an oval denudation, if necessary, is made upon the skin-perineum. It does not restore the torn fibres of the levator ani muscle to their original position. 2. *Emmet's Operation*.—The best. The crest or highest point of the rectocele is caught with a tenaculum, or a ligature passed through it. It is one of the guides for the denudation. If this point is drawn to either side of the vagina, it will expose on the opposite side a triangular area in which there usually lies a certain amount of scar-tissue. This is the area to be denuded on either side. Anteriorly, the denudation takes in only mucous membrane. Laterally, it extends up almost as far as the myrtiform caruncles which mark the orifices of the vulvo-vaginal glands. On the lateral wall of the vagina the denudation extends up higher than the original tear in order that the sutures may catch the retracted fibres of the levator ani muscle. The sutures are passed from above downward and well out toward the pelvic wall so as to catch the retracted muscles. The method of inserting is the same as in the primary operation. 3. The *Flap-splitting* or *Tait's Operation*, forms merely a skin-

perineum. Employed when there has been great loss of tissue either from sloughing or from repeated unsuccessful operations. It sacrifices no tissue. It consists in splitting the recto-vaginal septum. The first incision is made transversely in the recto-vaginal septum, then two lateral incisions are made running up toward the lower terminus of each nymphæ and down to a little above the anal orifice. These two flaps are dissected up; the upper one is drawn toward the urethra, the lower one down towards the anus. Sutures are passed laterally through these flaps and they are brought together. This operation makes a solid mass of tissue in the position of the perineal body, but does not restore the normal condition.

Treatment of Muscular Ankylosis.—Stretching the rigid muscles by some form of vaginal dilator, or by retracting—under ether—the perineum with a Sims' speculum.

IV. Results of Laceration of the Perineum.

Prolapse of Vaginal Walls.—*Cystocele.*—*Rectocele.*—The integrity of the pelvic floor and of the vagina, so far as its normal shape is concerned, is dependent upon the integrity of the perineum. Any laceration that involves the levator ani muscle, unless repaired, will produce sooner or later prolapse of the vaginal wall. *Causes of displacement of Vagina.*—1. Loss of support; 2. Subinvolution of the vagina, *i. e.*, that condition of the vagina when post-partum regression has failed, and it remains much larger, more flabby, and less contractile than normal. This process of involution is probably similar to that which reduces the uterus, *i. e.*, a fatty degeneration of its hypertrophied elements. If this regression fails or is only partly attained, subinvolution results. *Changes in Vagina consequent upon Pregnancy.*—During pregnancy there is a pure hypertrophy of all the vaginal tissues from increased blood-supply, as shown by the change in color and the “vaginal pulse,” signs of pregnancy. The connective tissue is increased in quantity, and its lymph-spaces are enlarged and engorged. The edematous tissues of the vagina become so

relaxed that the descending head of the child pushes the mucous membrane before it during labor, destroying its attachment to the subjacent structures. *Causes of Subinvolution of the Vagina.*—1. Congestion of the pelvic vessels. 2. Any laceration of the perineum. 3. Loss of support to the vagina and vaginal bloodvessels from atrophy of the muscles from any cause. 4. Excessive sexual intercourse. *Results of vaginal prolapse.*—1. Cystocele. 2. Rectocele. 3. Enterocoele.

Cystocele.—That condition in which the posterior wall of the bladder bulges into the vagina or perhaps presents at the vulvar cleft. Together with the prolapse of the bladder there is a prolapse of the anterior vaginal wall; hence the condition is truly a cystocele and anterior colpocoele. If accompanied by a prolapse of the urethra, the condition is called *urethrocele*. A cystocele presents the appearance of a soft pink tumor at the ostium of the vagina, readily yielding to pressure; it is distended and rendered more prominent when the patient coughs or bears down. *Diagnosis of cystocele.*—From cyst of the anterior vaginal wall. This, however, gives fluctuation upon pressure, is not yielding to the touch, and a sound introduced into the bladder will not come directly upon the point of the finger, as in the case of a simple cystocele. *Results of cystocele.*—Retention of urine in the pouch with fermentation and subsequent cystitis. The woman may be obliged to assist micturition by making pressure upon the protruding portion of the bladder.

Rectocele.—A bulging forward into the vagina, or through the vulvar cleft, of the posterior wall of the vagina and the anterior wall of the rectum. A pouch is thus formed in the rectum and defecation becomes difficult. The woman feels as if the movement of the bowels were about to take place through the vagina instead of through the natural passage. There results frequently an ulcerated condition of the rectum, and this may give rise to an error in diagnosis, the woman being treated for a catarrhal condition of the rectum instead of for a lacerated perineum. Owing to lack of retentive power in the vagina the semen escapes, and sterility often results.

Enterocoele, or Entero-vaginal Hernia.—This consists in the descent of a small portion of the intestine into the pelvis, so as to encroach upon the vaginal canal. *Varieties.*—

1. *Posterior enterocoele.* A knuckle of intestine that happens to be at the bottom of Douglas's pouch gradually stretches the serous prolongation, and, advancing between the rectum and vagina, pushes the posterior wall of the latter before it, so as to form a tumor at the vulva. 2.

Anterior enterocoele. In a similar manner, though very rarely, the intestine may advance between the bladder and uterus and depress the anterior wall. *Dangers.*—Occurring during labor, strangulation or contusion is to be feared. It may be injured in case of indiscriminate puncturing of vaginal tumors. In case of doubt resort to capillary puncture and aspiration with a hypodermic needle.

Vaginal prolapse in Nulliparæ.—Very rarely prolapse of the vagina occurs in those who have not borne children, as in girls of weak, delicate fibre, in whom the perineal body is found to be totally worthless and entirely incapable of performing its functions. In such cases a forcible prolapse of the whole uterus and vagina may be produced by sudden, powerful pressure from above, such as on lifting a heavy weight or violent straining at stool. In these *acute* cases, *treatment* consists in placing the patient in the knee-chest position, so that gravity will favor efforts at reduction, which should be made with well-oiled fingers.

Treatment of Vaginal Prolapse.—1. *Local astringents*; of no use. 2. *Pessaries.* The Gehrung and the Cutter cup-pessary. Of service only in the rare cases where operation is contraindicated on account of the extreme age of the woman or for some other reason. In stout women an abdominal bandage with a perineal pad may accomplish much good by relieving pressure from above. 3. *Colporrhaphy, Anterior and Posterior.* *Object.*—Narrowing of the vagina. This operation should always be supplemented by closure of the torn perineum by Emmet's operation.

Varieties of operation.—1. *Old method.* Oval denudation upon the anterior wall, extending from the urinary meatus almost to the cervix uteri. The whole surface of the oval may be denuded, or merely a strip around the

circumference of the oval, leaving an island of mucous membrane in the centre. The two sides of the oval thus formed are brought together by sutures. Of value when the prolapse is of but slight extent. 2. *Emmet's modification of Sims' operation.* The best general operation for cystocele. The uterus is strongly anteverted and held in this position by a sponge in the hand of an assistant, the patient being in the Sims' position, with the Sims' speculum introduced. Two points are selected on the anterior vaginal wall, one about an inch from the cervix on each side and a little behind the line of its anterior lip. These points must be so chosen that they can be drawn together in front of the uterus by means of a tenaculum in each hand, without undue tension, forming triangular-shaped folds. Then a surface half an inch square is to be denuded about the point of each tenaculum with a pair of scissors, and between these a strip of mucous membrane about an inch long by a half inch wide is to be removed from the vaginal surface in front of the cervix. A suture having been passed beneath each of these freshened surfaces, they are brought together, the two lateral areas lying over the median area. In this way two folds of mucous membrane are formed running down the anterior surface of the vagina. They are in the shape of an ellipse, and extend from the surfaces that have been secured in front of the uterus nearly to the vaginal outlet. The crest of each of these folds is then denuded and they are brought together with uninterrupted sutures. 3. *Stoltz's Purse-string, or Tobacco-pouch Operation.* A circular denudation embracing the larger portion of the prolapsed vaginal wall is made, and a thick silk suture with a needle at either end is passed just outside the edge of the wound, beginning at the point nearest the cervix and emerging near the side just below the urinary meatus. The stitch emerges and re-enters at short intervals; the denuded portion being thoroughly closed, is pushed upward toward the bladder with the sound; the two-sutures are then crossed and securely tied. This suture is easily removed. *After-treatment.*—Rest in bed for two or three weeks; catheterization when

necessary; the bowels moved as normally. For one or two months after operation, avoidance of heavy lifting, hard work, or sexual intercourse.

V. Flexions and Displacements of the Uterus.

NORMAL POSITION OF UTERUS.—Slightly anteflexed, the body and cervix inclined to each other at an obtuse angle of varying degree. This angle is larger in women who have borne children, and also varies with the degree of distention of the bladder. Roughly speaking, the axis of the uterus is perpendicular to the axis of the vagina, and about perpendicular to a line drawn from the symphysis pubis to the promontory of the sacrum. *The inclination of the axis of the uterus depends:* 1. Upon the position of the person; 2. Upon the degree of distention of the bladder; 3. Upon the facts of expiration and inspiration; 4. Upon the formation of the bony structure of the individual; 5. Upon the time of life (the axes of the pelvis change their direction with advancing years). *Methods of ascertaining position of uterus.*—1. By frozen or spirit-hardened sections of the pelvis and its contents; 2. By the bimanual examination of the pelvic contents; 3. By the use of the sound. *Elements determining the position of the uterus.*—1. Its ligaments; 2. The cellular tissue and fat of the pelvis; 3. Its juxtaposition to other organs; 4. Its own specific gravity (that of the surrounding structures); 5. *The retentive power of the abdomen* (the equality of the intra-abdominal pressure exerted in all directions in the normal condition. This equality is destroyed by lacerating the perineum, or when the abdominal walls are flabby and relaxed).

RELATIONS OF UTERUS.—The uterus lies normally to the front, but has a marked range of mobility. Its anterior surface touches the posterior aspect of the bladder. The external os uteri looks downward and backward, and the uterus is slightly twisted on its long axis, so that the uterine end of the left Fallopian tube is nearer the symphysis than the right. The small intestine lies upon the

uterus, ovaries, Fallopian tubes, and broad ligaments. Usually there is no small intestine in the vesico-uterine and Douglas's pouches. The posterior lip of the cervix is about one inch above the tip of the coccyx. By digital pressure the uterus can be elevated about one-half inch.

Vesico-uterine pouch.—Formed by the peritoneum passing downwards over the posterior surface of the bladder to a point at about the level of the os internum, where it crosses to cover the anterior surface of the uterus. *Douglas's pouch or cul-de-sac*.—Formed by the peritoneum covering the posterior surface of the uterus and one inch of the posterior vaginal wall and reflected up over the rectum.

LIGAMENTS OF THE UTERUS.—Four pairs: non-suspensory in function. 1. *Broad*: peritoneal folds extending laterally from the sides of the uterus to the pelvic walls. They contain the Fallopian tubes, connective tissue, unstriated muscle, bloodvessels, and lymphatics. 2. *Utero-sacral*: peritoneal folds passing from the lower lateral part of the body of the uterus outward and backward toward the second sacral vertebra. They are also known as the “*folds of Douglas*.” 3. *Utero-vesical*: peritoneal folds passing between the uterus and bladder. 4. *Round*: pass from the anterior superior part of the uterus near the cornua downwards, outwards, and forwards between the layers of the broad ligaments to the external abdominal rim.

PATHOLOGICAL DEVIATION IN THE FORM AND POSITION OF THE UTERUS.—1. Lesions of form, or *flexions*. If the flexion is forward, it is called *anteflexion*; if backward, *retroflexion*. 2. Lesions of position, or *versions* and *prolapse*. When the uterus lies too far forward it is said to be *anteverted*; when it lies with the fundus too far backward, it is *retroverted*. If bodily pushed forward, it is said to be *anteposed*; if bodily pushed backward, it is *retroposed*. It is said to be *prolapsed* when it falls down below its normal level. It may be subject to either one of the forms of flexion, and at the same time may be changed in position in a way that is pathological. Thus, it may be anteflexed and retroverted, retroflexed and retroverted, anteflexed and retroposed, etc.

ANTEFLEXION.—Not pathological, unless there are some symptoms directly referable to it. The point of flexion is at the junction of the body and cervix, and here the tissues of the uterine walls are deficient. *Cause.*—1. *Congenital* (most frequently), due to some arrest or derangement of development, as excessive development of the cervix, or over-development of the posterior uterine wall; or to improper habits of life (constipation, improper manner of sitting or of wearing the clothing). 2. *Acquired*, from inflammatory or degenerative disease, or from irregular involution (involution that does not proceed symmetrically in the anterior and posterior portions of the uterus).

Varieties.—1. Forward flexion of the cervix (body in normal position); 2. Forward flexion of the body (cervix in normal position); 3. Forward flexion of both body and cervix.

Effects of Antelexion.—1. Occlusion of internal os, with retention and accumulation of the secretions of the uterine cavity. 2. Interference with the circulation in the uterus. 3. Derangement of function with predisposition to endometritis and pelvic inflammation. 4. Dysmenorrhea. 5. Sterility from obstruction to the entrance of the spermatozooids.

Symptoms.—Dysmenorrhea and sterility. Menstruation is painful from its first establishment. The pain is intermittent and always precedes the flow, subsiding or becoming less when the flow begins. The trouble gradually tends to increase, and marriage only aggravates the symptoms. Pregnancy is rare, and should it occur there is great liability to miscarriage during the early months.

At first the intermenstrual periods are free from trouble, but eventually symptoms of uterine and vaginal inflammation are manifested. *Physical signs.*—Fundus markedly anterior; sulcus marking the flexion of the anterior wall may be plainly felt. Cervix may point in its normal direction.

Diagnosis.—From *fibroid tumor* in the anterior uterine wall, by presence of both the tumor and fundus on bimanual examination, and by the use of the sound.

Treatment.—Depends upon the variety of the flexion. No one method will be satisfactory in all cases. 1. *Frequent introduction of the sound or uterine bougies* (twice weekly). 2. *Pessaries.* Thomas's "stem" or "intra-

uterine" pessary. Dangerous, and not recommended. 3. *Skene's operation* (for imperfect invagination of the cervix into the vagina ; *i. e.*, the anterior lip of the cervix has not entered into the vaginal canal to the normal extent). Transverse division of the vaginal wall after the anterior column of the vagina has been put on the stretch by drawing the cervix backward toward the hollow of the sacrum. The transverse incision is about three-fourths of an inch from the os uteri, and about a quarter to three-eighths of an inch deep. On stretching the incised portion the upper and lower edges are drawn apart and the sides brought together to fill the space, the transverse incision becoming a longitudinal one ; three or four sutures are introduced. The anterior vaginal wall is thus increased in length. This operation is useless in old cases. 4. *Sims' operation*. Incision of posterior lip of the cervix in the median line up to the point of flexion to permit of communication between the upper portion of uterine canal and posterior vaginal fornix, so that the discharges may escape in a straight line, and not pass around the curve of flexure. Not recommended. 5. *Amputation of elongated cervix*, when such exists. 6. *Forcible dilatation*. Best method. About 15 minutes are usually needed for full dilatation. If there is a pinhole os, enlarge it by means of the closed blades of a pair of straight scissors, introduced with a boring motion. Follow operation by the introduction of a ten-grain vaginal suppository of iodoform, and a rectal suppository of opium. Keep the patient in bed for several days. *Time for dilatation*.—Midway between the menstrual epochs. Before operating be sure that there is no pre-existing pelvic inflammatory trouble.

ANTEVERSION.—Not a disease of itself, but one of the symptoms of other pathologic conditions. In pathologic anteversion, the change consists in a straightening of the uterine axis, so that the normal angle of forward curvature is diminished and the cervix points directly backwards. The condition is really a backward flexion of the cervix. *Causes*.—Those that produce chronic inflammation (subinvolution, laceration of the cervix, contraction of the utero-sacral ligaments). *Symptoms*.—None characteristic

of anteversion *per se*. There are present the local symptoms of chronic uterine and pelvic inflammation, derangements of the digestive and nervous systems. *Diagnosis*.—By backward pointing of cervix, anterior position of fundus with absence of normal forward curvature. *Treatment*.—None required. Treat the pathologic conditions that produce the version.

RETROFLEXION AND RETROVERSION.—Usually associated in practice. *Retroversion* of the uterus is a change in the axis of that organ, in which the fundus points toward the sacrum and the cervix turns towards the symphysis pubis or vaginal outlet. *Retroflexion* is simply a bending backward of the fundus upon the cervix. The most common posterior displacement of the uterus is a retroflexion plus a retroversion; a retroversion can rarely exist for any length of time without producing more or less retroflexion. *Physiologic retroversion* occurs when the bladder is fully distended, and ceases when that organ is empty. *Pathologic retroversion* is progressive, and appears in three degrees: 1. The fundus points toward the promontory of the sacrum; 2. The uterus lies almost transversely in the pelvis; 3. The fundus is low down in the pelvis with the cervix above; *Causes of backward displacements*.—Parturition, chiefly. general muscular debility; habits of indolence; tight bandaging after labor and a constant dorsal decubitus; the traction of pelvic adhesions; rupture of the perineum, with prolapse of the posterior vaginal wall (*frequent cause*); lateral laceration of the cervix, producing imperfect invagination of the latter into the vagina; blows and falls; irregular involution. Rarely it may be congenital. *Symptoms*. — Non-pathognomonic; same for the two conditions. Rectal tenesmus; backache; aching in the limbs; vesical irritation; neuralgic pelvic pains; difficulty in walking. All of these symptoms are aggravated by walking and standing, and are relieved by the recumbent position. In retroflexion there are frequently added symptoms of obstruction to the menstrual flow or other uterine discharges. The coincident displacement of the ovaries will give rise to a large number of associated symptoms. The dysmenorrhea of retroflexion is not as acute

as that of ante flexion, because of the larger size of the cervical canal. Sterility is present, though not as common as in anterior displacements. Should pregnancy occur, there is a tendency to abortion. *Diagnosis.*—Not difficult. In *retroversion* the finger in the vagina feels the cervix pointing forward toward the symphysis, and the fundus lying backward, while the abdominal hand notes an absence of the fundus. In *retroflexion* the cervix usually does not point so directly towards the symphysis; it may even point in its normal position, or in a line with the axis of the vagina. The fundus is felt posteriorly, and the sharp angle of flexion can be felt by the finger in the posterior vaginal fornix. Exclude fecal impaction, fibroid tumor of the posterior uterine wall, inflammatory conditions in Douglas's pouch, extra-uterine pregnancy, or a prolapsed and enlarged ovary. *Prognosis.*—Depends upon the recency of the displacement. Unfavorable when the fundus is bound down by adhesions, or when the shortness of the cervix will not permit the wearing of a pessary. *Treatment.*—1. Replacement of the displaced uterus; 2. Retention in its normal position. *Methods of replacing the uterus.*—Only possible when bands of adhesion do not exist. 1. The best. The patient in the knee-chest position, the Sims' speculum is introduced, and pressure made on the fundus through the posterior vaginal wall with a small sponge and sponge-holder, or with a uterine repositor. The result is due to the direct pressure on the fundus, and also to the tension on the posterior vaginal wall drawing the cervix upward and backward. A better point of pressure may be secured by the finger or sponge in the rectum. 2. Conjoined manipulation—one finger in the vagina and the hand upon the abdomen—the woman in the dorsal position. 3. The uterine sound and intra-uterine repositories (dangerous). *Instruments for retaining the uterus in its normal position.*—*Pessaries.*—Should be made of hard rubber or vulcanite. May be as instrumental for harm as for good. *Varieties.*—1. The *Hodge*. An elongated horseshoe, with a hard transverse bar joining the free ends, and a curved upper end adapted to the posterior fornix. The sides of the instrument are almost parallel. 2. The *Albert Smith*

modification. It contracts in its lower half to a more or less beak-shape, and has a greater curve downward in the lower end. Better adapted to the shape of the vagina.

3. *Thomas's modification*, with an enlargement of the upper bar.

4. *The ring.* Should never be used except when all other means fail. The shape of the pessary must be altered to suit the case. This may be done by dipping in boiling wax or lard, or by oiling it and holding it over the flame of a spirit-lamp. After moulding it, dip quickly into cold water.

Mechanical Action of the Pessary.—It lies upon the posterior vaginal wall, and is not a fixed support to the uterus in any sense of the term. It acts by pulling backward the posterior lip of the cervix, pressing the posterior vaginal fornix upwards and backwards, and thus tending to throw the fundus forward; *i. e.*, it has the same action as the utero-sacral ligaments.

Contra-indications to the use of a Pessary.—1. Pregnancy, unless there is threatened incarceration. 2. Vaginal inflammation. 3. Laceration of the cervix uteri (where it may increase the eversion of the lips). 4. The existence of any peri-uterine inflammation.

Rules for the Introduction and Wearing of a Pessary.—1. The uterine or upper end must always lodge behind the cervix. 2. The concavity of the larger curve must always look toward the anterior wall of the vagina, and the convexity must rest upon the posterior wall. 3. When in position, it should be freely movable. If properly introduced, the finger can be readily passed on either side of it and between the symphysis pubis and the lower bar. 4. In retroflexion it must be long enough to span the angle of flexure and to press on the uterine body above the angle. 5. The uterus must be in its normal position before the pessary is introduced. 6. The best positions for the patient to assume during the introduction are the *genu-pectoral* or the *Sims'*. 7. The instrument should be well oiled, grasped by its lower bar, and passed into the vagina with its plane not in the median line, but slanting, so that one lateral bar presses against either lateral vaginal sulcus; the posterior bar is then carried behind the cervix. 8. The length of the pessary should be equal to the distance from the posterior fornix to a point corresponding to the upper end of the

urethra. The *transverse* measurement may be taken by opening a pair of long dressing forceps in the upper part of the vagina to an extent that will touch the lateral vaginal walls without making undue pressure on them. 9. After the introduction, the patient should be advised to take a vaginal douche of hot water night and morning; to keep the bowels open; to avoid undue exertion; to rest as much as possible. 10. If the pessary produce any discomfort, it should be removed at once. 11. It should never be worn more than two months at a time. 12. Should pregnancy take place while the pessary is in the vagina, it is not necessary to remove it, nor should it be removed until the possibility of incarceration is past. Its presence does not interfere with coitus.

Operations for the Cure of Retroflexion.—A great variety have been proposed. 1. *Alexander's Operation*, shortening of the round ligaments in order to hold the fundus of the uterus forward toward the anterior abdominal wall; applicable only in cases without pelvic adhesion. The inguinal canal is opened on either side of the pubis, and the uterus being thrown forward and held in its normal position, the round ligaments are drawn out until the fundus uteri touches the anterior abdominal wall. Then the ligaments are firmly sewed into the canal and the excess cut off. A vaginal pessary is worn for some months until the ligaments are firmly attached. 2. *Wylie's Operation*, shortening the round ligaments after abdominal incision. The ligament is folded upon itself and held in this position by sutures. 3. *Ventrefixation*, or *abdominal hysteropexy*. A median incision is made in the anterior abdominal wall immediately above the symphysis; the fundus is brought forward to the lower angle of the abdominal incision and fastened there by sutures passed through the abdominal wall and *posterior* portion of the fundus. This is the most desirable operation in the great majority of cases owing to the usual accompanying disease of the tubes and ovaries, necessitating their removal. The adhesions formed between the fundus and anterior abdominal wall need not necessarily be permanent. All that is needed is that they last long enough for the normal supports of the uterus to regain their tonicity and strength.

PROLAPSE OF THE UTERUS.—“Falling of the womb.” A downward displacement of the organ. Always associated with a degree of retroversion and descent of the other pelvic viscera. *Varieties*.—1. *Complete*, the uterus entirely outside of the body; also called *procidentia*. 2. *Incomplete*, the uterus entirely or in part in the vagina. *Methods of Development*.—1. The descent is primarily in the uterus, because of increased weight of that organ (subinvolution, metritis, fibroid or other tumor). 2. The descent is primarily in other pelvic structures (the vaginal walls, bladder, rectum), which, by dragging upon the uterus, cause its prolapse. This is usually secondary to loss of the pelvic floor or of its supporting power. These two varieties may be associated. *Causes of prolapse*.—1. Elongation and stretching of the supports of the uterus. 2. Diminution in the retentive power of the abdomen, as from loss of muscular power of the abdominal walls. 3. Constant coughing and straining. 4. Change in the direction of the axis of the pelvis, it becoming more nearly parallel to the axis of the body (*senile prolapse*). The intestines now rest directly upon the uterus, which is no longer sheltered by the sacral promontory. This may occur in old maids as well as in women who have borne children. 5. The improper wearing of clothing and the *abuse* of the corset (too tight lacing). 6. Continuous heavy lifting. 7. General weakness from exhausting disease or old age. This is the cause of prolapsus in consumptive women. 8. Most important and most frequent, the injuries and improper management incident to childbearing (imperfect involution of the vagina and pelvic viscera due to post-partum inflammation, too early resumption of the active duties of life, or laceration of the perineum). *Elongation of the Cervix*.—Commonly called “*hypertrophic elongation of the supra-vaginal portion of the cervix*.” Produced when the prolapse occurs first in the vagina. The fundus uteri is practically in its normal position, *i. e.*, at its normal height, but the portion of the cervix lying between the external os and the body of the uterus is stretched out to an inordinate extent. It results from the constant dragging upon the cervix when the body of the uterus, for some reason, fails to prolapse. It is not a pri-

mary condition. The elongated portion is the isthmus and lower portion of the corpus uteri rather than the vaginal portion of the cervix. A proof that this elongation is due to traction is the fact that when the traction is relieved, by reducing the prolapsed organ and confining the patient to bed, the elongation diminishes. Every case of prolapse of the vaginal wall will not necessarily result in elongation of the cervix. It may produce a simple prolapse of the uterus; but when the fundus is restrained by the strength of its ligaments, by the retentive power of the abdomen, by the connective tissue that surrounds it, or by adhesions, then the weakest portion yields to the traction, and elongation of the isthmus and lower portion of the corpus uteri results. There is frequently associated with this condition a hypertrophy of the vaginal portion of the cervix uteri from congestion following constriction of the venous supply. *Symptoms of Prolapse of the Uterus.*—Rectal and vesical tenesmus; constant desire to evacuate the rectum and bladder, relieved by the recumbent posture, and aggravated by walking, lifting, coughing, and standing. Menstruation is generally unaffected. *Physical Signs.*—1. Of *incomplete* prolapse.—Cervix resting on pelvic floor; body of uterus posterior, pressing upon the rectum. 2. Of *complete* prolapse.—A more or less pear-shaped tumor presenting at the vulvar cleft, at the apex of which is an opening corresponding to the cervical canal; this mass is soft and flabby. If the uterus is prolapsed, the body of the organ may be felt in the interior of the presenting tumor; but in the typical case of prolapse with elongation of the cervix, only the cervix is, as a rule, felt in the body of the tumor, forming the axis, as it were, of this tumor. It feels like a thick and rigid tube or cord, continuous with the body of the uterus, which may be felt, on bimanual examination, behind the pubic bone. The uterine sound shows a length from the fundus to the external os of from four to eight inches. *Diagnosis.*—From fibrous polyp of the uterus, inversion of the uterus, and hypertrophic elongation of the infra-vaginal portion of the cervix. The first two may be excluded by the absence of the os and the cervical canal, and by the fact that they are covered with the mucous membrane of the uterus, while

the prolapsed uterus is covered with the mucous membrane of the vagina. *Treatment.—Indications.*—1. To restore the displaced organ ; 2. To keep it in place ; 3. To restore the supports of the uterus ; 4. To remove complications and accompanying affections. Remove the cause if possible ; treat a subinvolted uterus by puncturing the cervix, by applications, by repair of laceration of the cervix, by curettement. Repair laceration of the perineum, if present. Reduce the prolapsed uterus by placing the patient in the knee-chest position, and with oiled fingers pushing the mass back through the vulvar cleft into the vagina, when it will immediately be pushed upward by the atmospheric pressure. If the perineum and muscular supports of the perineum are intact, some form of pessary or vaginal support may be used, as the cotton-pack. In many cases of incomplete prolapse a simple ring pessary may be used ; if there is a marked retroversion or retroflexion, a Hodge or Smith pessary may be of service. It may be retained by means of a perineal pad attached to an abdominal bandage. In employing the pessaries in this condition use the *smallest* instrument that will keep the uterus in place to avoid unnecessary tension on the vaginal walls. Cutter's cup-pessary may also be used in exceptional cases in old or very fat women. The bowels in all cases should be kept free. *Operative treatment.*—The various forms of operations used for the cure of prolapsus uteri may be classified as : 1. Support derived from the vagina, vulva, or perineum ; 2. The uterus raised by shortening the round ligaments ; 3. The uterus sutured to neighboring structures (*hysteropexy*), through the vagina or by means of laparotomy ; 4. Hysterectomy, or removal of the uterus. Emmet's operation on the perineum, and Emmet's or Stoltz's operation for cystocele may be sufficient. In cases of long standing, *Le Fort's operation* to support the uterus from the vagina is best. It consists in suturing together the anterior and posterior vaginal walls throughout a portion of their surfaces. The vertical length of the freshened surfaces is about $2\frac{1}{2}$ inches, the width about an inch. This surface extends from the lowest point at which the anterior and posterior walls meet when the uterus is in place to as high a point as the two surfaces can

be brought together without undue tension. This operation does not interfere with coitus, fecundation, or labor. Hysteropexy or Alexander's operation may be used in cases of simple prolapse of the uterus, but even these fail in some instances, and then hysterectomy may have to be resorted to. If the cervix is hypertrophied, amputate that organ.

HYPERTROPHY OF THE INFRA-VAGINAL PORTION OF THE CERVIX.—A peculiar and rather rare affection. The hypertrophy is confined to the vaginal portion of the cervix, which is considerably lengthened. The uterus is in its normal position, as are also the vaginal fornices. There is no increase in the diameter of the cervix, and no changes occur in the composition of the tissues. *Cause.*—Not known. It is most common in single women, though occasionally present in those who are married and sterile. *Symptoms.*—Precisely the same as those due to prolapse: pelvic tenesmus; sense of over-distention of the vagina; leucorrhea; often dysmenorrhea. Excoriations and ulcerations of the mucous membrane are often produced. *Diagnosis.*—From prolapse of the uterus and from hypertrophy of the cervix. Bimanual touch reveals the fundus at its normal height, the vaginal walls occupy their normal position, and the vaginal fornices are normal. *Treatment.*—Amputation of the redundant portion of the cervix with the écraseur, galvano-cautery, or knife. The cervix is first split laterally on each side as high up as the amputation is to be made, and the two flaps are removed by a wedge-shaped incision; the flaps are then sutured together. Bleeding may be controlled by passing a rubber cord around the cervix above the point of operation. After amputation the cervix retracts, hence it should be left a quarter of an inch longer than desired. The mucous flap should be longer than the inner flap to allow for the difference in the degree of contraction between the mucous membrane and the muscular and vaginal portion of the cervix. No dressing is necessary. A vaginal douche should be given once or twice daily.

VI. Laceration of the Cervix Uteri.

CAUSES.—*Parturition.* Lacerations are of more frequent occurrence than is generally supposed, many tears being overlooked, even the most extensive. Not only will parturition at term produce a tear, but also the forcible expulsion of an ovum through the unprepared lower segment of the uterus at as early a period as two or three months (*miscarriage*). Laceration of this kind is especially liable to occur in the case of *criminal abortion*. Occasionally due to *operative treatment*, as incision of the cervix, or it may be a *congenital* split condition of the cervix, with prolapse or eversion of the mucous membrane. According to Skene, there are also rare cases of prolapse of the mucous membrane of the cervix in endometritis.

VARIETIES OF LACERATION.—1. Through the posterior lip; 2. Through the anterior lip; 3. Single lateral tear; 4. Bilateral tear; 5. Stellate tear (three or more lacerations radiating from the cervical canal); 6. Incomplete laceration (a tear through the mucous membrane and muscular tissue of the cervix without laceration of the mucous membrane covering the vaginal portion of the cervix). Lacerations of the anterior lip are most common, but usually heal readily during the puerperium. Lateral lacerations are most commonly met with in practice. Those of the posterior lip occasionally produce a cellulitis back of the cervix, resulting in an intractable form of retroversion.

APPEARANCE OF LACERATIONS.—When the rent has extended to the vaginal junction or beyond, there will exist a tendency for the tissues to roll out from within the uterine canal on assuming the upright position. Subinvolution of the uterus follows, and the everted mucous tissues become eroded and may be mistaken for ulceration or epithelioma. The surface is granular and raw-looking (though really covered with epithelium); it is thrown into numerous folds, producing glandular recesses and processes which give rise to the granular appearance. Small retention-cysts (*Nabothian follicles or cysts*), feeling like small shot, may be produced by obliteration of the ducts of the glandular recesses, producing a follicular form of this condi-

tion of the cervix. The raw surface is in fact a new-formed, glandular secreting surface, resembling in structure the normal cervical mucous membrane, and this addition to the extent of secreting surface increases the leucorrheal discharge. The eroded condition extends upon the mucous membrane of the vaginal portion of the cervix. The various names applied to this condition of the cervix are "*erosion*," "*ectropion*," "*eversion of the mucous membrane*," and "*catarrhal patch*," the latter being the best term. The *incomplete form of laceration* may be unilateral or bilateral; generally both walls are divided from within outward to the outer mucous coat. It is usually described as a patulous or dilated condition of the uterus; but a careful examination shows that the cervix is divided into two parts that are held together by the outer coat or mucous membrane. There is usually no eversion of the mucous membrane of the cervix in this form of laceration because the two flaps are held together by the intact vaginal mucous membrane.

RESULTS OF LACERATION.—1. Subinvolution of the cervix and of the whole uterus; 2. Hyperplasia or hypertrophy of the cervix; 3. Cervical and corporeal endometritis; 4. Uterine fungosities; 5. Menorrhagia; 6. Uterine displacements; 7. Chronic inflammation outside of the uterus; 8. Chronic ovaritis; 9. Epithelioma; 10. Absolute sterility (probably due to the leucorrheal discharge, which prevents ingress of the spermatozoa) or a tendency to abort.

SYMPTOMS.—Lacerations of the cervix uteri in themselves produce no symptoms. The symptoms are due to the secondary pathological conditions. Menstruation is often irregular, and is generally increased in duration. Neuralgia manifesting itself as local tenderness at the seat of laceration, or as neuralgic pains in the pelvis generally, or in the groin, and radiating down the leg or over the body. Reflex disturbances are common (cataleptic convulsions, profuse sweating, hysterical anuria). These reflex disturbances may be the result of the presence of cicatricial tissue in the angles of the laceration (*Emmet*). If there is no eversion of the lips, there may be no symptoms present.

DIAGNOSIS.—Readily made by vaginal examination. Difficulty arises when there is much eversion of the mucous

membrane of the cervical canal, with thickening of the cervical tissue. By rolling in the flaps of the torn cervix with the finger placed in either vaginal fornix the true condition may be recognized. Examination with the Sims' speculum with the patient in the knee-chest or Sims' position will confirm the diagnosis.

TREATMENT.—Only by operative procedures. The *primary* suture of lacerations of the cervix is not recommended; the *secondary* treatment alone will be considered. Every case of lacerated cervix demands operation, to avoid subsequent trouble, especially the development of epithelioma, and the operation for the repair of the laceration is called *trachelorrhaphy*. The *contraindication* to operation is the existence of inflammatory action outside of the uterus (pelvic peritonitis, pelvic cellulitis, disease of the Fallopian tubes). To determine this, always make a careful bimanual examination under ether before operation. *Preparatory treatment.*—Churchill's tincture of iodine to the cervix and vaginal vault; frequent hot-water douches; glycerol of cotton. The patient should lie on her back and permit the water to flow in from a fountain syringe. Nabothian cysts should be punctured with a long, spear-pointed knife, and the cervix also, to relieve the congestion. If there is much disease of the mucous membrane of the uterus, curetting may be required before closing the cervix. A displaced uterus should be replaced. If this fail, amputate the cervix. *Best time for operation.*—About a week after the menstrual period. *Instruments.*—Two or three tenacula; pair of sharp scissors curved on the flat; a cervix knife; a needle-holder; needles (sharp, straight or curved); suture-material (silver, silkworm-gut, catgut. The best suture-material is silkworm-gut, shotted); shot-compressor; shot. *Position of Patient.*—Sims' or the dorsal position, preferably the latter. *Emmet's Operation.*—The cervix is drawn down with a tenaculum or with a suture passed through one or both lips, but without unnecessary traction. The denudation should be equal on each side, leaving in the center a uniform strip of mucous membrane one-quarter of an inch in width, which corresponds to the future cervical canal. The excision of tissues should be carried well up

into the angle of laceration and all cicatricial tissue should be removed. The denudation must not be carried too far out on the vaginal surface of the cervix, otherwise tissues will be rolled in from the position which they normally occupy. If there is much bleeding, it may be controlled by placing an ordinary rubber umbrella-ring around the cervix at the vaginal junction. If the circular artery or its branches are cut, catch with forceps, or pass a suture around it through the vaginal tissue a short distance above the angle of laceration. A stitch may be passed through the cervix as high up as possible and twisted about one side of the neck. If the bleeding is not controlled, untwist the suture and twist the ends around the other side of the cervix. Such a stitch may be left in position for two days or more ; it does not interfere with the circulation, since the collateral circulation is kept up in the other half of the cervix. In closing the wound three or four sutures are all that are required to a side, each being passed deeply to include the whole denudation. The apposition of the lips should be accurate. In case of *multiple* lacerations there are several methods to be pursued. Instead of obliterating each fissure separately, they may be grouped in a unilateral or bilateral operation, by excising the small nodules in a wedge-shape, and bringing the stitches together, thus converting the case of multiple laceration into one of bilateral lacerations. Or, one laceration at a time may be operated upon, the others being reserved for future operations. It is not desirable to operate upon too many of these lacerations at the same sitting, as the stitches are liable to cut out, or the parts liable to be strangulated. *Incomplete* lacerations must be made complete by splitting the intact mucous membrane of the vagina. *After-treatment*.—Very little required. Keep the uterus in a normal position, if it has been retrodisplaced, by the use of a gauze tampon. The patient should remain in bed for about two weeks. If there is a vaginal discharge, give a warm bichloride douche twice a day. The sutures should not be removed for two weeks after the operation. After the operation of trachelorrhaphy labor is not, as a rule, retarded by the condition of the cervix, nor does laceration necessarily occur again.

VII. Endometritis.

Inflammation of the lining mucous membrane of the uterus.

VARIETIES.—1. Acute (rare). 2. Chronic (common).

ANATOMY OF THE UTERUS.—The walls of the uterus are composed of three elements, the *outer* covering being the peritoneum, the *middle* coat unstriped muscular fiber, and the *internal*, mucous coat. The cavity of the uterus and its mucous membrane are divided into the cervical portion and its membrane, and the cavity of the body and its membrane. The cavity of the body is triangular and curvilinear, while the canal of the cervix is spindle-shaped. The constricted portion at the junction of the body and cervix is the *os internum*, and the termination of the cervical canal below is the *os externum*. The uterus is triangular-shaped with its apex below. It varies in size in different women, and is somewhat larger in those who have borne children than in virgins. Its entire outside length is about three inches, the width from the entrance of one Fallopian tube to the other about two inches, and it is about one inch in thickness. It is divided into the *fundus*, *body*, and *cervix*. The cervix is about as long as the body, and very nearly as thick; it is divided into the *intra-vaginal* and *supra-vaginal* portions, the former being that part which projects into the vagina, the latter that which extends from above the vagina to the body of the uterus. The portion connecting the cervix and the body is called the *isthmus*, and is the weakest portion of the organ. The *mucous membrane of the cavity of the body* is smooth and thin ($\frac{1}{25}$ to $\frac{1}{12}$ of an inch thick). It is composed of a single layer of ciliated columnar epithelium together with a basement layer, and is firmly united to the fibrous tissue of the middle wall of the uterus. It contains a number of glands which are known as *utricular glands*. These dip obliquely downward and end in the connective and muscular tissue immediately beneath the membrane. Some are simple tubular glands, others tubular glands bifurcated at their lower ends. Two or three of them may have but one opening on the free surface. The *mucous membrane of the cervical canal* is arranged in an entirely

different manner. From the internal to the external os there are sulci which divide the membrane into four columns. The membrane between the sulci is arranged in oblique folds or ridges, the whole constituting the rugous appearance to which the name "*arbor vitæ*" has been given. It is covered throughout with ciliated columnar epithelium. The glands of the cervix are of the racemose type and are called the *glands of Naboth* or *Nabothian glands*. They open both on the elevations and in the depressions of the mucous membrane. The *mucous membrane covering the cervix outside of the os externum* contains no Nabothian glands, and has all the general characteristics of the mucous membrane of the vagina, of which it is a part. It consists of vascular papillæ covered with many layers of squamous epithelium.

ACUTE ENDOMETRITIS.—Generally affects the mucous membrane of the cervix and that of the body of the uterus. *Causes.*—1. Traumatism resulting from the use of an unclean sound (*septic endometritis*). 2. The use of tents and stem pessaries. 3. The use of the uterine curette and intra-uterine injections. 4. Extension of gonorrheal inflammation from the vulva and vagina (probably the most frequent cause). 5. Sudden suppression of the menstrual flux (from cold, mental excitement, etc.). 6. The exanthemata, cholera, phosphorus-poisoning. 7. Retention of any decomposing substance in the uterine cavity (portion of placenta, retained menstrual blood). *Symptoms.*—Pain of a dull aching character; dragging sensations within the pelvis and in the back; tenderness over the hypogastric region; rectal and vesical tenesmus; leucorrhea, at first slight and serous, later free, mucous, muco-purulent, or purulent, at times bloody. *Physical Signs.*—Os more or less patulous; cervix swollen, red, edematous, eroded; uterus tender, softened, slightly enlarged. The sound should not be introduced. *Diagnosis.*—Easy, by the symptoms and signs. *Prognosis.*—Ordinarily not dangerous to life. Graver in the septic and gonorrheal forms, on account of the danger of general septicemia and the production of tubal disease. *Treatment.*—Rest in bed with the hips elevated. For the pain, rectal suppositories of

opium and belladonna. The bowels should be kept loose. Fomentations may be applied to the lower part of the abdomen. Vaginal injections of hot water (100°–120° F.) are required to cleanse the parts, remove the discharge, and relieve the pelvic congestion. In the septic form, the decomposing matter must be removed from the uterine cavity under thorough antiseptic precautions.

CHRONIC ENDOMETRITIS.—*Varieties*.—1. *Cervical*, or that affecting only the mucous membrane of the cervical canal (*most common*). 2. *General*, or that affecting the mucous membrane of the whole uterus (*next in frequency*). 3. *Corporeal*, or that affecting only the mucous membrane of the body of the uterus (*least frequent*). All of these varieties may occur together.

Chronic Cervical Endometritis.—The most frequent disease of the female pelvic organs. *Pathology*.—It is essentially a glandular disease. At first there is a hyperemia of the glands of Naboth, which become swollen, elevated, enlarged, and yield a hypersecretion. Later the mucous membrane of the cervical canal becomes thickened by proliferation of the connective tissue and by distention of the bloodvessels, and is thrown into fine rugosities, which give the surface a granular appearance. The glands become congested, but there is no new formation of glandular tissue. Their ducts may become obliterated, and Nabothian cysts result, appearing on the surface as whitish, pearly-looking points, and feeling like shot imbedded in the membrane. They are filled with a clear or straw-colored fluid. In cases of long standing all of the cervical tissues become indurated or sclerotic. *Causes*.—Many constitutional states may be accompanied by this condition of the mucous membrane of the uterus as a symptom. The *predisposing causes* are imperfections in the general organs and in the development and growth of the sexual organs, the scrofulous and tuberculous diatheses, sedentary habits, unsuitable clothing, over-fatigue in standing and walking, deranged nutrition from insufficient nutriment, mental or physical over-taxation, frequent childbearing, prolonged lactation. The *exciting causes* are imperfect involution after confinement or menstruation, and especially after miscarriage or criminal

abortion; injuries to the uterus from displacements, the use of ill-fitting pessaries, injuries during confinement causing puerperal inflammation, and gonorrheal virus. *Symptoms*.—Not diagnostic. Usually there is no marked constitutional disturbance. In cases of long standing there may be some general debility. There may also be irregular menstruation in these cases; but this is not the rule. There is always a more or less profuse leucorrhea, and the character of this is diagnostic. It is dense, thick, opaque, and tenacious, while vaginal leucorrhea is serous, non-tenacious, and usually purulent in character. With this there is backache located in the sacral region, with pelvic tenesmus. The symptoms are all aggravated by muscular exercise. *Physical Signs*.—Usually unsatisfactory. The external os may be patulous and roughened. By speculum examination the os externum and the cervical canal are generally found filled with the characteristic albuminous discharge; the cervix is eroded; the enlarged Nabothian follicles may be seen. On introducing a sound *the internal os will be found non-dilated*, thus differing from corporeal endometritis. *Diagnosis*.—From vaginitis and corporeal endometritis. This is made by the characteristic leucorrhœas of the two conditions. *Prognosis*.—The duration of an untreated case of cervical catarrh is indefinite. It has no self-limitation. Uncomplicated cases generally yield to the proper treatment. There is in many, however, a tendency to a recurrence of the disease, even after recovery has been perfect. *Treatment*.—1. *Constitutional*.—Tonics and the preparations of iron (Blaud's pill, Basham's mixture, "The four chlorides"). The formulæ for these are as follows: *Blaud's Pill*—℞ Pulv. ferri sulph. exsic., Potas. carb., āā ℥iij; Glucose, q. s. M. et ft. pil. No. xlviij. *Basham's Mixture*—℞ Tinct. ferri chlor., ℥iij; Acid. acetic. dil., ℥ss; Liq. ammon. acet., ℥iijss; Curaçoa, Syrupi, āā ℥j; Aquæ, q. s. ad. ℥viij. M. Sig. A tablespoonful after meals. *Mixture of the Four Chlorides*—℞ Hydrarg. chlor. cor., gr. j-ij; Liq. arsen. chlor., gtt. xlviij; Tinct. ferri chlor., Acid. hydrochlor. dil., āā ℥iv; Syrupi, ℥iij; Aquæ, q. s. ad. ℥vj. M. Sig. ℥j-ij in water after meals. Purgatives should also be administered, preferably the following

saline preparation: R Ferri sulph., gr. xij; Magnes. sulph., ʒiiss; Sod. chlor., gr. xij; Acid. sulph.dil., ʒiiss; Infus. quassiaë, ad. ʒvj. M. et Sig. A tablespoonful before meals. Ergot in small, frequently repeated doses is of value in controlling the circulation in the uterus. Fluid extract of hydrastis canadensis, 20 drops three or four times a day, will check the hypersecretion from the uterine glands, and is of value in menorrhagia. The bromides to control the nervous system, the irritability, and the congestion of the pelvic organs. Rest as complete as possible should be insisted upon. 2. *Local*.—(1) Replace a retroflexed uterus and introduce a pessary to hold it in position. (2) Moderate exercise, followed by rest in the recumbent position to modify the pelvic circulation. (3) *Hot-water vaginal injections* with the patient lying on her back with the hips elevated. Not less than half a gallon of water, and from this up to two or three gallons, are required for each injection. The best form of syringe for administering these injections is the *Davidson syringe*, with a hard-rubber bulb, or the *vaginal irrigator* or *fountain syringe*. The nozzle should be of hard rubber of sufficient size, with a straight tip, the extremity olive-shaped and having small openings, and the whole length five inches. The temperature of the water should be from 100° to 120° F., the temperature being gradually raised as the injection is administered. An injection should be given by some other person than the patient once, twice, or thrice a day, the best time being immediately before bedtime. As the patient improves in health, the quantity of water for the injections may be lessened, and the temperature gradually lowered to 60°, and then discontinued. *Object of the hot-water injections*: 1. Cleansing; 2. Contraction of the bloodvessels; 3. To medicate the surfaces when any medicinal substance is added to them—the most useful substance for this purpose is boracic acid, ʒj to Oj of water, the last pint of the injection containing the acid. (4) *Topical applications to the vaginal portion of the cervix and vaginal vault*, the patient in the Sims' or knee-chest posture. Best for this purpose is tincture of iodine, or Churchill's tincture of iodine (iodine, gr. lxxv; iodide of

potassium, ℥iiss ; alcohol, ℥j). The application should be followed by a glycerol of cotton. This should be removed at the end of 12 or 15 hours, and its removal followed by a vaginal injection of hot water. Boracic acid or tannic acid may be combined with the glycerine, the former being called boroglyceride (a 50 per cent. solution), and the latter glyceride of tannin (tannin ℥j-ij to glycerine ℥j). (5) If the mucous membrane of the cervix is highly hyperemic, *superficial scarification* may be resorted to by means of a long, sharp pointed knife. This should only be repeated at intervals of from three to five days. (6) In severe cases, *applications directly to the cervical canal*, observing strict antiseptic precautions, the patient in the Sims' or knee-chest position. The applications are made by means of an applicator or by Skene's instillation-tube. The safest and most efficient agents to use are sulphate of zinc (1 or 2 grains to the ounce), nitrate of silver, chloride of zinc, tannic acid, bichloride of mercury, tincture of iodine (one or two parts) and carbolic acid (one part). The two last named are most useful. The anterior lip of the cervix may be grasped with a tenaculum or forceps to steady it. The application should be made not later than three or four days before, or not sooner than three or four days after, a menstrual period. Usually one application every five or six days will answer. (7) When these measures fail, the curette should be used.

Chronic Corporeal Endometritis.—The least frequent variety, and generally confined to women who have *not* borne children. *Causes.*—1. *Predisposing.*—The strumous and tubercular diathesis ; a general weakened and non-resisting state of the constitution. 2. *Local or Exciting.*—Complicated labors ; miscarriages ; derangement of menstruation ; sepsis ; gonorrhea. Retention of hypertrophied decidua and young placental masses after parturition and miscarriage is a very frequent beginning of endometritis. Gonorrhea produces a most stubborn and generally incurable form. Enforced sterility in those who endeavor to prevent impregnation is a cause. *Varieties and Pathology.*—In some cases there is a general congestion and thickening of the entire membranes, with increased vascu-

larity and nutritive activity of the utricular glands, resulting in hypersecretion. The discharge from these glands is more serous, less tenacious, and more frequently contains blood (*rusty-colored*—Bennett) than the discharge of cervical endometritis. The whole mucous membrane may be denuded of its epithelium, or it may be so only in part; the congestion also may be greater in spots, and in these places there is thickening of the membrane. These thickened red patches are generally found at the mouths of the glands. Not infrequently there are proliferations of the mucous membrane, polypoid in character (*endometritis polyposa*). Another form is that in which the mucous membrane is hypertrophied to three or four times its normal thickness, elevated through its whole extent in a soft cushion-like swelling, or in more localized spongy masses (*endometritis fungosa*). The hypertrophy does not extend beyond the internal os, thus resembling in its situation a decidual membrane. Microscopic examination of scrapings made by the curette shows that there is great hypertrophy of the mucous membrane with increase of all its elements, *enlargement of the blood-vessels* (chief characteristic) and marked cellular infiltration of the connective tissue. The walls of the uterus may sometimes be thickened as well as the cavity enlarged; in other cases they may be diminished in thickness and the seat of a fatty degeneration. When chronic endometritis has persisted for a long time, the mucous membrane becomes atrophied, the ciliated and then the cylindrical epithelium is lost, and replaced by small polymorphous cells. Finally the mucous membrane disappears entirely and is replaced by a layer of connective tissue; the utricular glands may fall out, or may be constricted to form retention cysts (rounded hemispherical projections or pedunculated tumors varying in size from a pin-head to a large pea, elastic to the touch, and with transparent contents—*cystic endometritis*). According as the changes affect one or other of the two elements of the mucous membrane there is described a *glandular*, an *interstitial*, and a *mixed* form of endometritis. *Symptoms*.—1. *Constitutional*.—The general health is undermined; there is loss of weight and strength; the patient becomes anemic, and reflex sym-

thetic disorders appear in the digestive, circulatory and nervous systems. Cephalalgia of a burning character, especially on the crown of the head, is very common. Hysteria, hystero-epilepsy, catalepsy, melancholia, and even insanity may develop. Pigmentations on the forehead and face often occur; appetite is impaired and capricious; there may be nausea and vomiting, especially at the approach of menstruation. Occasionally the general symptoms simulate very closely those of pregnancy, there being present nausea and vomiting, enlargement of the abdomen from flatulency, pain and tenderness in the mammæ, with probably amenorrhea. Tilt regards the signs of pregnancy in young women without menstrual suspension as *prima facie* evidence of internal metritis. 2. *Local*.—Most important is derangement of the menstrual functions. The menstrual discharge may be profuse, scanty, irregular, and attended with pain, or altogether suppressed. Generally there is present a profuse, prolonged, and painful menstruation. The condition of amenorrhea is usually observed in those cases of long duration in which the mucous membrane has become smooth, indurated, and atrophied. Severe back-ache, pain in the uterus, pelvic tenesmus, vesical and rectal irritation and rusty-colored leucorrhea (see *Pathology*) are present. Profuse and dangerous hemorrhages sometimes occur from the fungoid condition of the endometrium. Sterility is present in the majority of cases, for the following reasons: (1.) The discharges are inimical to the vitality of the spermatozoa; (2.) There is frequently some obstruction to the entrance of the spermatozoa within the uterine cavity, either from stenosis or from the quantity of morbid secretion; (3.) Should fecundation take place, there is an inability of retention and fixation of the fertilized product because of the unhealthy endometrium. *Physical Signs*.—Tenderness on bimanual examination; a somewhat enlarged condition of the uterus, and a discharge from the cervical canal. After thoroughly cleansing the vagina with a douche, a small tampon of cotton may be placed against the cervix and allowed to remain for two or three hours. If pus is found on the cotton when removed, it is a valuable sign of corporeal endometritis. The use of the uterine

sound elicits abnormal tenderness, especially when the sound strikes the fundus of the uterus; it also shows that there is an enlargement of the uterine cavity, that there is a dilatation of the internal os, a condition that does not exist in cervical endometritis, and that the endometrium is very vascular, the simple passage of the instrument producing some hemorrhage. In addition, the sound shows the presence of any roughness, or polypoid, fungoid, or cystic growth from the endometrium. *Diagnosis.*—From cervical endometritis. 1. There is much greater constitutional disturbance than when the disease is confined to the cervix. 2. By the character of the leucorrhea. 3. There is very much more menstrual disturbance (it is unusual to have menstrual disturbance in a simple case of cervical endometritis), manifesting itself as a menorrhagia, a metrorrhagia, or an amenorrhea. 4. By the dilated condition of the internal os. 5. By the use of the curette (for purposes of diagnosis the dull wire curette is the best), followed by microscopic examination of the scrapings. *Prognosis.*—Corporeal endometritis is not a fatal disease in itself, although when long protracted it affects the constitution and produces chronic ill-health. In case of excessive hemorrhage the condition becomes grave. The disease is stubborn and treatment is often protracted. The occurrence of conception will produce the most favorable conditions, and with care to prevent abortion, a cure may be hoped for. The affection is limited by the period of functional activity of the uterus, and the most obstinate cases generally recover at the menopause. Gonorrheal cases are so intractable that hysterectomy may have to be resorted to. This is also true of the tuberculous form. *Treatment.*—1. *Constitutional.*—The same as for cervical endometritis. Tonics, chiefly, as iron (when there is not excessive bleeding, or after such bleeding has been controlled), ergot, the bromides, hydrastis canadensis (of special value in cases with profuse bleeding, the fluid extract in doses of 20 to 40 drops, three or four times a day, being administered). Atropin, best administered hypodermatically in doses of one 150th or one 100th of a grain, given once, twice, or thrice in the 24 hours, is of value in

controlling the bleeding in cases of *endometritis fungosa*.
Local.—1. In some cases hot-water injections and the iodine and glycerine, or the two combined with intra-cervical applications, will suffice; in other cases local medication addressed solely to the cervix will answer, the disease of the corporeal cavity being arrested through the derivative and depletive influences of the agents applied to the cervix. 2. Cases requiring *intra-uterine* treatment are comparatively rare. They comprise those cases in which the disease is localized at a point above the internal os, or in which the general form has originated in a corporeal disease. Intra-uterine medication is best administered by means of the applicator, or if it be desirable to avoid contact of the medicine with the cervical canal, a cervical speculum may be introduced through which the applicator can be passed to the body of the uterus. Skene's glass pipette may also be used to carry the medicine to the uterine cavity. *Steps of the application*.—The Sims or genu-pectoral position; Sims speculum; the anterior lip of the cervix is grasped with a tenaculum or forceps and drawn down to straighten the cervical canal; if the internal os be not sufficiently dilated for making the application, it should be enlarged with the uterine dilator; the medicines used may be tincture of iodine, Churchill's tincture, carbolic acid, a mixture of Churchill's tincture and carbolic acid. *Intra-uterine injections should not be used*. They are very efficacious in the treatment of diseases of the body of the womb, but for reasons not yet fully understood they are liable to be followed by dangerous symptoms such as severe uterine colic with collapse and rapid peritonitis. (If the healthy uterus be injected with fluid there will be produced uterine pain and colic, abdominal tenderness, feeble, weakened pulse, coldness of the extremities, nausea and vomiting, and other indications of shock.) These symptoms may be due to passage of the fluid through the Fallopian tube, only, however, when very great force has been used in making the injection, and when there is a patulous condition of the tube. It is probable that the accident occurs in cases in which there is some peri-uterine disease that has not been looked for (*intra-uterine treat-*

ment is contra-indicated by peri-uterine disease). 3. One of the most useful instruments for treating endometritis is the *uterine curette*. The Thomas curette is the one to be preferred for diagnostic purposes, the Sims curette or the Martin curette for purposes of treatment. *Indications for the use of the curette.* (1.) Endometritis following miscarriage or confinement, with retention of portions of the placenta; (2.) A roughened or fungoid condition of the endometrium; (3.) Stubborn cases that have resisted other methods of treatment; (4.) Endometritis fungosa, with excessive hemorrhage. *Method of using the curette.*—(1.) The operation should be done preferably in the first days after menstruation; (2.) The patient should be anesthetized; (3.) She is placed in the dorso-sacral position, the thighs supported by assistants; (4.) The vulva and vagina must be thoroughly cleansed; (5.) The Sims speculum is introduced, the anterior lip of the cervix seized with a Volsella forceps or tenaculum and the cervix drawn down to the vulva; (6.) The uterine sound is passed to ascertain the direction and depth of the canal and the cavity of the uterus; (7.) Forcible dilatation of the cervix with the Goodell dilator to permit of more room for the applicator; (8.) The curette is then introduced, and the cavity of the uterus is scraped in the following order: anterior face, posterior face, fundus, angles, sides; (9.) The uterine cavity is thoroughly washed out to remove all débris, and the douche continued until the water returns but slightly tinted with blood. The douche may consist of plain warm water, a solution of boracic acid, or a bichloride solution, 1–2000; (10.) Application to the uterine cavity, preferably after curettement, of pure carbolic acid; or the cavity of the uterus may be packed with iodoform-gauze, which need not be removed for 48 hours. A possible *accident* in this operation is perforation of the uterine wall; especially is this likely to occur after labor or abortion. The curette does not remove the whole mucous membrane; the glands dip down into the muscular coat, and these fundamental portions are never removed, but quickly reproduce the destroyed mucous surface. After curettement, the fecundity of the woman is no more compromised than after abortion

or labor. It should be remembered that after curettement it frequently happens that the following menstruation is missed, and sometimes the second or third.

Chronic General Endometritis.—Second in frequency, and largely confined to multiparæ. Its symptoms and treatment are the same as for the other forms of endometritis.

VIII. Malignant Growths of the Uterus.

VARIETIES.—Malignant growths of the uterus may be divided into two kinds, *carcinomata*, or those growths arising from the epithelium of the uterus, and *sarcomata*, or those arising from the connective tissue. The growths arising from the epithelium of the uterus have been divided by some writers into two classes, *malignant adenoma* and *carcinoma proper*, but the distinction between the two is not based on any pathologic difference. *Malignant adenoma* is a rare tumor composed of a reproduction of the branching cervical glands, or of the tubular glands of the body of the uterus. It is probably a form of carcinoma. *Carcinoma* is a tumor composed of an irregular growth and proliferation of the epithelial elements, the cells appearing in clusters and strings imbedded in a proliferating connective tissue. Its usual seat is in the *cervix*.

1. CANCER OF THE CERVIX.—Three varieties are described: (1.) The *scirrhus carcinoma*; (2.) The *medullary* or *encephaloid carcinoma*; (3.) *Epithelioma*. In *scirrhus*, the fibrous stroma is in excess; in *encephaloid*, the cellular element is in excess. Under *epithelioma* are included those forms of carcinoma of the cervix that begin more superficially, spread more slowly, and do not involve the connective tissue; they are not so malignant as the other forms, and are more local in character. These tumors are often termed *cancroid*, in contradistinction to the *scirrhus* and *medullary* varieties which are termed *true cancer*.

CLINICAL DIFFERENCES BETWEEN CARCINOMA AND EPITHELIOMA.—1. *Carcinoma* progresses rapidly, produces metastasis, affects the connective tissue rapidly. *Epithe-*

lioma progresses slowly, does not produce metastasis, and spreads by extension. 2. *Carcinoma* generally occurs in the substance of the cervix. *Epithelioma* occurs superficially within the cervical canal, or without upon the vaginal portion of the cervix. 3. *Carcinoma* produces thickening, then ulceration. *Epithelioma* excavates the cervix, and spreads downward into the vagina, often producing the cauliflower excrescence. After ulceration and breaking down have occurred the varieties of cancer of the cervix are indistinguishable.

POINTS OF DEVELOPMENT OF CARCINOMA.—1. *In the substance of the cervix beneath the mucous membrane.* Hard nodules appear, that increase in size, and finally produce ulceration. *Origin*, probably the distal ends of the mucous glands of the cervix. 2. *In the interior of the cervical canal*, spreading along its mucous membrane so as to excavate the canal. *Origin*, the epithelial cells of the mucous membrane of the cervical canal. 3. *Upon the vaginal aspect of the cervix*, as an ulcerating surface, or as an irregular papillary tumor which may attain a considerable size. *Origin*, mucous membrane at the margin of the external os and the mucous membrane of the vaginal portion of the cervix.

DIRECTIONS OF GROWTH.—1. Upwards into the body of the uterus; 2. Downwards into the vagina; 3. (*Most important.*) Into the connective tissue of the pelvis, by means of a continuous infiltration of the adjacent connective tissue, or as a chain of nodules running in the direction of the utero-sacral ligaments. Cancer of the vaginal portion of the cervix usually extends laterally into the fornices and adjacent connective tissue and but rarely upwards into the cervix. Cancer of the cervix above the vaginal portion spreads into the uterus and connective tissue.

RENAL INVOLVEMENT IN CANCER.—Of great frequency. The ureters are very frequently involved by extension of cancer from the cervix. They are either surrounded and pressed upon by the contracting tissue, or they are directly affected by infiltration of their walls with the cancerous process. The caliber is diminished below, and dilated above up to the renal pelvis by the constant accumulation

of urine under pressure ; the walls are thickened and often tortuous. If the bladder be involved, a catarrhal cystitis is produced, and through sloughing of the tissue a fistula results. A ureteritis and a septic pyelonephritis are thus among the first and gravest consequences of cancer. The rectum is rarely involved, and the peritoneum also resists the invasion of the disease.

CAUSES.—1. *Predisposing*.—Race, heredity, age. Cancer of the uterus is very rare in the colored race. Age is the most important predisposing cause. Before the age of twenty it is extremely rare ; after that age it slowly increases in frequency until fifty, when the predisposition to it gradually diminishes. The *local* predisposing causes are erosion of the cervix, protracted catarrh, and repeated parturition with laceration of the cervix.

SYMPTOMS.—1. *Local*.—The course is not typical ; the onset is insidious. The attention is probably first attracted by slight hemorrhages at other than the regular periods, as after some exertion. Irregular bleeding, increased menorrhagia at or about the period of the menopause, or the re-establishment of the menses after their cessation, is a valuable *early* sign of cancer. With this, there appears a leucorrhœa without any special characteristics. In the *later stages* of the disease there are well-marked the *three characteristic symptoms*, hemorrhage, offensive discharge, and frequently pain. The *hemorrhage* becomes now very free, and is excited by any trivial cause (long standing, straining at stool, coitus, vaginal examination) ; it rarely produces death. The *discharge* follows ulceration ; at first it is yellowish-white in color, but afterwards, from the decomposition of the fatty cells, it becomes of a reddish-brown color, and of a highly characteristic offensive odor. *Pain* is not a constant symptom ; it may be entirely absent, and depends upon the seat of the lesion and the direction in which it extends ; if the disease is limited to the cervix, pain is not present ; when the body of the uterus or the pelvic structures are involved, it is present. Its character varies ; it is a dull, gnawing sensation, localized in the pelvis or the back, or a sharp, shooting pain, radiating to the back or down the thighs to the knees. Pruritus

vulvæ, due to the acrid and irritating discharge, may become very troublesome. 2. *Constitutional*.—In the early stages there is no apparent effect upon the patient's general health or appearance. Later, there is developed a marked cachexia. Obstinate constipation or copremia is present, due to direct involvement of the rectum, or because defecation is extremely painful and hence is repressed. Successive attacks of sub-acute uremia, due to the lesion of the ureters, supervene, and in this condition, which eventually becomes chronic, the patient dies. Towards the close there may be slight elevations of temperature.

PHYSICAL SIGNS.—Best detected by the finger. Of the *early stage* not always plain. Scirrhus carcinoma gives a hard, hob-nailed, or nodular feel to the finger, and (1.) the mucous membrane seems to be immovably fixed on the subjacent connective tissue (a condition only met with in malignant growths); (2.) a sponge tent or uterine dilator fails to dilate a cervix the seat of malignant disease, whereas in all other neoplasms dilatation may quickly and easily be obtained. The *speculum* in the early stage is a useful aid in the examination. It reveals the nodulated condition of commencing scirrhus cancer, and the deep, purplish or livid color of the cervix, with enlarged vessels ramifying about the nodules. Microscopic examination of a portion of the tumor, or of scrapings from the body of the uterus or the cervical canal, will conclude and confirm the examination. Of the *advanced stage*, no matter what variety of malignant growth may be present, the physical signs are the same, and easily recognized. A rough, friable, cauliflower-like mass will be felt, irregular, bleeding upon the slightest touch, and surrounded by a tough, unyielding, irregular zone of infiltrated tissue: if ulceration has occurred there will be found the characteristic crater-like excavation.

DIAGNOSIS.—Syphilitic ulceration with condylomata on the cervix; papillary erosion, or ectropion, with cicatricial tissue; small fibroid in the cervix; sloughing polypi of any kind; and hypertrophy of the cervix with induration and occluded follicles may be mistaken for carcinoma. *Syphilitic ulceration and condylomata* are very rare, and when

present disappear under appropriate treatment. There is also the specific history. *Erosion and ectropion* may be diagnosed by the ability to cause the eroded surface to disappear by rolling the lips together. This is impossible in carcinoma. A small *fibroid in the cervix* is generally accompanied by a fibroid condition in the body of the uterus, and the history of hemorrhage and other symptoms is different. *Sloughing polypi* and *sloughing fibroid tumors* that are being squeezed out from the uterus, are surrounded by a cervix, as shown by the speculum, even though this may be very much attenuated. The fibroid polyp is soft and more or less elastic, with no signs of friability, whereas the carcinomatous mass is unyielding, inelastic, and very friable. There is also present a certain amount of fever, which is absent in cancer, and there will be in the discharges shreds of normal uterine tissue, while in cancer discharges of epithelial cells will be prominent. In *hypertrophy of the cervix* with *induration and occluded follicles*, the mucous membrane is movable upon the underlying tissues, and the cervix is dilatable with a sponge tent. The *microscope* will generally serve to settle any doubt that may exist in the diagnosis, but where a doubt still exists, radical operation should be performed in order to prevent the disease from progressing too far.

PROGNOSIS.—Fatal without operation; good if radical operation be performed early. *Pregnancy Complicating Cancer*.—Cancer predisposes to abortion, and pregnancy seems to accelerate the growth of the cancer. The prognosis in this condition is therefore graver than in cases not so complicated. The fetus also is usually destroyed.

CAUSE OF DEATH IN CANCER.—1. Exhaustion; 2. Uremia (*very frequent*); 3. Peritonitis (*very rare*); 4. Septicemia; 5. Hemorrhage.

TREATMENT.—*Palliative or radical*. 1. *Radical or Operative Treatment* (only possible when the tumor is limited to the uterus itself). Adhesion of the uterus from old peritoneal inflammation with fixation, unless the fixation is due to cancerous infiltration, does not contra-indicate operation. *Contra-indication to operation*.—Involvement of the lymphatic glands of the pelvis, of the broad ligament,

bladder, or rectum, or of the vaginal walls. Constitutional treatment for the cure of any form of malignant disease of the uterus should never be considered. Total extirpation is the only proper method of treatment where the growth is limited. The complication of pregnancy does not contra-indicate the operation. The operation of the removal of the uterus by the vagina is called *colpo-hysterectomy*, and in cases of cancer of the cervix it is preferable to the operation for removal of the uterus by abdominal incision, because the involved mucous membrane of the vagina may be more clearly seen and excised. *Methods of operation.*—1. *Martin's colpo-hysterectomy by ligature.*—The ureters are the most important structures to avoid. They run behind the uterine arteries, beside the cervix uteri at a distance of one-half inch from the cervix on either side. *Preliminary Treatment.*—1. Etherize patient if necessary to secure a thorough bi-manual examination with relaxed abdominal walls. 2. If the cervix be covered with friable vegetations which are causing a fetid discharge, they should be curetted about a week before the operation, with the application, if necessary, of some hemostatic (chloride of zinc, 1 to 10), or the actual cautery, followed by thorough antisepsis (irrigation twice daily with sublimate solution, 1:2000, followed by the application of iodoform tampons). 3. Two or three hours before operation a large simple enema should be given to thoroughly empty the large intestine. The bladder also should be emptied at the beginning of the operation. *Steps of Operation.*—1. After etherization the patient is placed in the dorso-sacral position, the vaginal walls are retracted, and the fourchette is depressed. 2. If possible, the cervix uteri is closed by a continuous suture running through both lips and inverting any diseased tissue to avoid infection from this septic surface (often impossible). If the vagina is very small, rendering the operation difficult, the perineum may be incised as a preliminary stage. This wound must be closed as soon as the uterus is removed. 3. *Opening of Douglas's pouch.*—The posterior vaginal wall is stretched by drawing the cervix, by means of Volsella forceps, downward and forward; it is then incised transversely down to and through the peritoneum across the whole

width of the posterior cul-de-sac. (If desirable, the posterior or peritoneal layer of Douglas's pouch may now be sutured to the posterior vaginal wall, to cover the cellular tissue that has been exposed.—*Not always advisable.*) 4. *Hemostatic suture of the pelvic floor, or ligation of the uterine artery.* The left index finger is passed into Douglas's pouch and presses the left broad ligament down against the vaginal roof. A large curved needle grasped by a needle-holder is then carried through the anterior part of the left lateral fornix, through the broad ligament above the uterine artery, and out again through the vaginal roof close to the end of the posterior incision. A corresponding ligature is passed on the right side. Then with scissors the bases of the broad ligaments are cut through close to the uterus as high as these ligatures reach. 5. *Opening of the vesico-uterine pouch.*—The cervix is drawn backwards and a transverse incision is made down to the muscular substance of the uterus at the line of junction of the vaginal mucous membrane and the anterior surface of the cervix. The bladder is carefully separated from the uterus by the finger, handle of a scalpel, or scissors. (If it be desired, the peritoneum or the posterior wall of the bladder may now be sutured to the anterior vaginal wall.—*Unnecessary.*) 6. *Retroversion of the uterus* in order to render accessible for ligation the upper portions of the broad ligaments. This is very difficult to perform (either by forceps, tenacula, or fingers), and if not possible to do so, the organ may be drawn down as far as possible with the Volsella forceps in the cervix and the ligaments ligated from below upwards as before. The ligaments are then separated from the uterus a small portion at a time. *To prevent vaginal prolapse.*—The upper portion of the broad ligament should be united to the commissure of the vaginal wound in order that the vagina may have some support from above. 7. *Drainage and dressing.*—The vaginal wound should be left open to favor drainage; the anterior and posterior walls fall together so completely that at the end of the operation no intestines are visible. The vagina should be filled with the *gauze-pack*. Between the two broad ligament stumps a tampon of iodoform-gauze, long enough to project from the vulva, is introduced, and

around this the vagina is loosely packed with iodoform-gauze. This is to be renewed according to the amount of serous or bloody oozing, but may be retained in place for two or three days to a week. 2. *The Clamp Method*.—Hemostasis is effected by the use of one or more clamps or forceps of various kinds applied to each broad ligament. The clamps are left on for from 48 to 72 hours. *Objections*.—(1.) It is often difficult with one clamp to reach high enough to control the whole of the broad ligament; (2.) If the uterus cannot be drawn well down to the vulvar orifice the upper edge of the broad ligament cannot be felt so as to insure including nothing but broad ligament in the instrument; (3.) There is danger of slipping. 2. *Palliative Treatment*.—Required when the disease is too far advanced for operative procedures. The *indications* are to relieve hemorrhage, discharge, and pain. To avoid *hemorrhage* the patient should abstain from hard work, long standing and sexual intercourse, and should keep the bowels loose. Ergot internally and astringent injections of tannin, alum, boracic acid, or vinegar, or cotton tampons impregnated with tannin, subsulphate of iron (the dry powder or as a glycerol) or antipyrin (5–10 grains sol.) will control bleeding. To avoid hemorrhage on the removal of the tampons, give first before removing a douche of warm water to free adhesions to the friable cervix. The exceedingly offensive discharge may be controlled by astringent and antiseptic injections (solution of bromine, 1 part to 3 of water, or permanganate of potash in ordinary surgical strength), or by frequent washes of plain water. Chloral hydrate solution, \mathfrak{Zi} –iii to the pint of water, is also valuable (*Goodell*). For the *pain*, opium in large doses by suppository or hypodermatically. *Palliative Operation*.—Thorough removal of the fungating or granulating mass by the ordinary sharp spoon curette, the knife, or scissors, the patient in the dorso-sacral position with a Sims speculum introduced. The curettement is followed by a thorough cauterization with fuming nitric acid, solution of chloride of zinc, or the actual cautery to control the bleeding. The canal and uterine cavity should be packed with masses of absorbent cotton soaked in a chloride of zinc solution (*two strengths*: 1. Chloride of zinc, \mathfrak{Zi}

to water 3i; to be used when the walls are thin, as shown by the sound in the bladder and the index finger in the uterus for the anterior wall, and the sound in the uterus and a finger in the rectum for the posterior wall; 2. Chloride of zinc and water equal parts to be used when the walls are of normal thickness). Excoriation of the vagina and vulva may be prevented by smearing them previously with a preparation of soda bicarbonate 1 part to vaseline 3 parts, and after packing the uterine canal with the zinc chloride cotton, its surface, together with one inch of the upper portion of the vagina, should be covered with absorbent cotton saturated in a 30 per cent. solution of bicarbonate of soda. Hypodermatic injections of morphine should be given for the pain that follows this operation. The packing should be removed on the second or third day, or, if the dressing be firmly adherent, a day or two later. The slough which results separates in five to ten days, and this may come off in one piece, like a cast of the uterus. Another method (that of *Sims and Van de Walker*) consists in amputation of the cervix at the vaginal junction, and excavation as far as the internal os. This cavity is packed with small masses of cotton soaked in a solution of persulphate of iron (1 to 3 of water) and squeezed nearly dry. This dressing should be removed on the second day.

2. CANCER OF THE BODY OF THE UTERUS.—Much rarer than cancer of the cervix. *Origin*.—Either in the substance of the uterine walls (the distal ends of the utricular glands) or in the mucous membrane. In the former case it begins as localized nodules that grow rapidly and produce bulging of the mucous membrane or of the peritoneal coat, but do not tend to ulcerate. When in the mucous membrane it causes a uniform swelling, or more usually projects in polypoidal masses. *Causes*.—Age; it occurs later in life than cancer of the cervix, the average age being about 54 years; it is also much more common in sterile and single women. *Symptoms*.—Pain, hemorrhage, and fetid discharge. *Pain* is always an early symptom and is well marked. It is periodic and of a paroxysmal character, almost pathognomonic of the disease. *Hemorrhage* is present at a very early stage as a profuse menorrhagia.

The *discharge* is usually profuse, and becomes after a time fetid. *Physical signs*.—The cervix is either normal or dilated; the uterus is enlarged (may reach the size of the pregnant uterus at 4 months), and may be freely movable or fixed by adhesions. Unless absolutely necessary, the sound should not be used. It reveals irregularities of the mucous membrane and increased length of the uterine cavity. *Diagnosis*.—Must be made largely from the symptoms and the microscopic examination of fragments removed by the curette. *Treatment*.—Total extirpation *per vaginam* or by celiotomy.

3. SARCOMA OF THE UTERUS.—A connective-tissue tumor of an embryonal type, formally called *recurrent fibroids*. *Seat*.—Usually in the body of the uterus; very rarely in the cervix. *Varieties*.—1. Diffuse sarcoma of the mucous membrane; 2. Circumscribed fibrous sarcoma. *Pathology*.—1. The *diffuse sarcoma of the mucous membrane* arises from the epithelial connective tissue. It appears as a general swelling of the mucous membrane, which becomes soft and crumbling, or as irregular foldings or knobby projections into the uterine cavity of a grayish-white, brain-like appearance, and a soft, pulpy consistence (*pathognomonic*). Microscopic examination reveals a small round-celled infiltration of the mucous membrane (more rarely spindle cells). 2. The *circumscribed fibroid sarcoma* arises in the muscular coat of the uterus. It may be *sub-mucous*, *interstitial*, or *sub-peritoneal*. The tumors are of a firm consistence, and feel like knots in the muscular wall of the uterus, or project as polypi into its cavity. They have no capsule. Microscopically they consist of a localized round-celled infiltration. Secondary sarcomatous nodules may form in the vagina and in the peritoneal cavity. *Causes*.—Age is a predisposing cause, the disease occurring usually between the ages of 40 and 50 years. It affects the sterile and unmarried women as well as those who have borne children. *Symptoms*.—Hemorrhage, absence of pain, a watery, non-offensive discharge, and a cachexia. The *hemorrhage* first appears as an increase of the menstrual flow, or as irregular hemorrhages after the menopause. This hemorrhage is due to hyperemia of the mucous mem-

brane and not to ulceration of the walls of the bloodvessels (as in cancer). The *discharge* is of a rice-water character, with only a slight odor. It contains characteristic grayish-white shreds, like particles of brain-matter. Under the microscope these are found to consist of small portions of sarcomatous tissue. *Cachexia* is pronounced. *Diagnosis*.—Not difficult if the tumor project through the os as a soft, friable pediculated growth. If nothing projects, the os must be dilated and a finger introduced into the uterine cavity, when a slightly friable condition of the mucous membrane may be recognized, or a distinct polypoid tumor or a localized thickening in the walls found. Sarcoma may be mistaken for chronic endometritis of a hemorrhagic type with small interstitial or polypoid fibroid tumors, and for carcinoma of the body of the uterus. In either case, however, the treatment is the same. *Prognosis*.—Grave. The development, however, is not so rapid as that of carcinoma. *Treatment*.—Total extirpation *per vaginam* or through an abdominal incision.

IX. Fibroid Tumor of the Uterus.

Synonym, “Bleeding Disease of the Uterus” (Duncan).

The most frequent new-formation in the uterus. It is exceedingly common, and occurs in about twelve per cent. of women over forty years of age.

VARIETIES.—Three classes, according to the position which the tumor occupies in the uterus. 1. *Intra-mural*, or *Interstitial*, when it is entirely confined to the muscular coat of the uterus. 2. *Sub-peritoneal*, when its growth is directed outward to the peritoneal surface, pushing the peritoneum in front of it, and becoming more or less pedunculated. 3. *Sub-mucous*, when its growth is in the direction of the uterine cavity, so that it becomes located immediately beneath the mucous membrane. These terms are more or less relative.

DESCRIPTION OF VARIETIES.—1. *Sub-peritoneal*.—The thickness of the pedicle varies, and its length determines

the mobility of the tumor. If the tumor grows upwards into the abdomen, it draws the uterus forcibly upwards, thus producing great elongation of the uterine cavity with thinning of the walls. The cavity may measure six or more inches. Sub-peritoneal fibroids are marked by rapid growth and great bulk. The symptoms, however, are less dangerous than those of the other varieties. The pedicle may become twisted, and edema and gangrene follow. Adhesions also form between them and adjacent structures (*omentum, intestines*), and in this way they gain additional nutrition. The tumor may be severed entirely from its uterine attachment by traction from these adhesions, or by sudden falls or jars, and may then lie loose in the peritoneal cavity or exist as a fibroid tumor growing apparently from an intestinal wall. Intestinal obstruction may follow dense adhesions. *Intra-ligamentous fibroids* are sub-peritoneal fibroid tumors that have not become pedunculated, but have grown laterally or posteriorly deep in the pelvis beneath the peritoneum or between the peritoneal folds of the broad ligaments. These tumors are more fixed in the pelvis than other peritoneal tumors, cause more displacement of the pelvic organs, and more severe pressure-symptoms. 2. *Sub-mucous*.—Most important from a clinical point of view. They project into the uterine cavity either as a general swelling or protuberance of one wall of the uterus, or as a regular uterine polyp, *i. e.*, they may be sessile or pedunculated. Projecting into the uterine cavity they act as a foreign body and produce uterine contractions, which may cause: (1) extrusion of the tumor from the uterine cavity as a polyp; (2) the tumor may be enucleated after ulceration of the mucous membrane, and be bodily expelled from the uterus; (3) sloughing may take place from interference with the blood-supply, and the tumor be discharged piecemeal.

PATHOLOGY.—*Origin*.—The middle or muscular coat of the uterus. It is composed both of connective tissue and of muscular tissue. When the latter element preponderates the tumor has been called a *myoma*. *Fibro-myoma* is another term for this growth. *Seat*.—Generally in the body of the uterus at the fundus or in the posterior wall; they are un-

common in the cervix, though occasionally found there. *Structure*.—Unstriated muscular fiber and fibrous connective tissue. *Macroscopic Appearance*.—1. Of the *myoma* or *muscular tumor*. A pale, flesh-colored tumor, having a soft consistence, passing gradually into the surrounding uterine wall, and usually single. Often it has no capsule. 2. Of the *fibro-myoma* or *true fibroid tumor*.—Of firm consistency, pale color, resembling fibrous tissue; it cuts like cartilage, the cut surface having a glistening, satin-like appearance. Its capsule, so called, consists of loose fibrous tissue together with the immediately adjoining muscular layer of the uterus; it is but loosely attached to the tumor, so that the latter can be shelled out with the finger. There is no infiltration of adjacent tissues. The capsule is very vascular, often containing enormous veins, but the tumor itself is very deficient in bloodvessels; its nutrition is apparently effected by transudation from the capsule. Rarely, fibroid tumors possess a cavernous structure consisting of dilated bloodvessels (*myoma cavernosum*). Fibroid tumors are usually multiple, the numbers varying from two or three distinct tumors up to forty or fifty nodular masses. *Growth*.—Usually slow, and the more fibrous tissue there is, the slower is the growth. Myomatous tumors and cystic fibroids, however, may grow very rapidly. The growth is accelerated by any cause that increases the congestion of the pelvic organs. They increase in size during the menstrual periods, and during pregnancy; marriage, by increasing the activity of the sexual organs and therefore the congestion of the pelvic region, often causes a rapid development in pre-existing tumors. *Size*.—May become enormous (130 or 140 pounds); usually from the size of an egg to that of an adult head. The tumors generally continue growing until the menopause, which is much delayed (often ten years later than normal). The menopause once established, the tumor generally diminishes in size.

CHANGES IN THE UTERUS AND ITS MUCOUS MEMBRANE CONSEQUENT UPON FIBROID TUMORS.—The muscular wall hypertrophies; the uterus increases in size, and its cavity is elongated. Especially is this true of the interstitial and sub-mucous varieties. In the sub-peritoneal growths the

hypertrophy and elongation exist in the first stages, but after pedunculation the uterus may return to its normal size or even undergo a form of atrophy and become smaller than normal. The enlargement of the uterus seems to be independent of the size of the tumor, a small growth of the lower segment causing considerable hypertrophy of the whole organ. The *mucous membrane* undergoes a marked change. Endometritis is usual, and is most marked in the interstitial and sub-mucous varieties. In many cases there are fungoid or polypoid vegetations of the endometrium. This endometritis exists in two forms: 1. A *glandular* variety, *i. e.*, an hypertrophy of the glandular portion of the mucosa; 2. An *interstitial endometritis*, *i. e.*, an hypertrophy of the connective tissue of the mucosa. The *glandular* variety occurs in cases of interstitial fibroids, while the *interstitial* occurs in cases of sub-mucous fibroids. According to the form of the endometritis depends the menorrhagia or metrorrhagia of the case. The glandular form of endometritis does not result in hemorrhage in the majority of cases, whereas the interstitial form, by compression of the numerous vessels, causes venous congestion and hemorrhage. The increased hemorrhage at the menstrual period is due to this pathologic change in the uterine mucous membrane.

CHANGES IN THE SURROUNDING ORGANS CONSEQUENT UPON FIBROID TUMORS.—1. *The Tubes*.—The mucous lining undergoes the same alteration that is seen in the uterine mucosa, and various forms of salpingitis result. Disease of the Fallopian tubes and ovaries will be found in the great majority of cases of fibroid tumor of the uterus. In some cases this tubal and ovarian disease may be primary, but in many cases it is the direct result of the diseased condition of the mucous membrane of the uterus. The tubal condition may be a *pyosalpinx* (collection of pus in the tube), or a *hydrosalpinx* (a collection of water in the tube). 2. *Other Organs*.—The effects of fibroid tumors upon the surrounding organs depend upon the size and position of the tumor, and are chiefly due to pressure or traction. Pressure upon the *rectum* causes constipation, a hemorrhoidal condition of the rectal veins, fistula, and

fissures ; upon the *bladder* and *urethra*, cystitis, or total obstruction to the passage of the urine ; upon the *ureters*, dilatation of these structures with hydro-nephrosis and renal degeneration (not an infrequent cause of death from fibroid tumors) ; upon the *pelvic nerves*, intense neuralgia ; upon the *return veins from the lower extremities*, varicose veins and edema of the legs. Intra-ligamentous sub-peritoneal fibroids produce the worst pressure-symptoms. Traction upon intestinal adhesions may produce obstruction or strangulation of the bowel ; the bladder may be distorted by attachments to an upward-growing tumor, the fundus at times reaching up to the umbilicus.

DEGENERATIVE CHANGES IN FIBROID TUMORS.—1. Edema ; 2. Fatty degeneration ; 3. Suppuration and gangrene ; 4. Calcification ; 5. Myxomatous or colloid degeneration ; 6. Cystic degeneration.

Edema may occur periodically at the menstrual period as a result of the increased congestion of the tumor at that time ; it also results from obstruction to the venous circulation in the capsule of the tumor. The tumor is soft and cystic to the feel, and even fluctuating (*spurious fluctuation*). Such tumors have been tapped for ovarian cysts. If laid open, they are found to be completely infiltrated with serum ; small cysts in immense numbers exist in the meshes of fibrous tissue and the muscular tissue has largely disappeared.

Fatty degeneration is supposed to be the cause of the diminution in size or total disappearance of fibroid tumors which sometimes occurs after labor and at the menopause. This degeneration probably occurs in the muscular elements of the growth, which is absorbed, and the fibrous tissue alone is left.

Suppuration is rare in any but the sub-mucous fibroids. It occurs as a result of injury from operative interference, or from constriction of the pedicle during the process of expulsion. *Gangrene* occurs especially in the sub-mucous variety, and is due to interference in the nutrition of the tumor from inflammation of the capsule. The capsule being broken, the tumor is expelled by uterine contractions, entire or piecemeal.

Calcification occurs in cases of low vitality of these growths. It is unusual, though not very rare. It consists in a deposition of lime salts (chiefly phosphate) in the substance of the tumor. The calcareous masses are called *womb-stones*. They may be discharged by ulceration through the rectum or through the bladder, or by extrusion from the vagina by uterine contraction.

Myxomatous or colloid degeneration consists in an effusion of a mucous fluid between the muscular bands or into the connective tissue. It is distinguished from simple edema by the presence of mucin and the proliferation of nuclei and small round cells in the interstitial tissue.

Cystic degeneration is uncommon. It consists in an accumulation of fluid between the bundles of connective tissue or muscular tissue. The fluid may consist of blood, serum, or mucus, or it may be the result of degeneration of the tumor (*fatty degeneration, suppuration*). These cystic tumors may be formed by dilatation of the lymph-spaces which normally exist in the tumors, and then they form a distinct variety of fibroid tumor characterized by a steady growth that jeopardizes the patient's life. The fluid from these tumors of lymphatic origin coagulates upon exposure to the air (*a valuable diagnostic sign*).

Malignant Degeneration.—It is still a disputed question whether or not a fibroid tumor predisposes a woman to the development of carcinoma. It is probably a conservative view to say that fibroid tumors of the uterus may rarely undergo sarcomatous degeneration, and also that they put the mucous membrane of the uterus in a condition favorable for the development of carcinomatous degeneration.

FIBROID TUMOR OF THE CERVIX.—Rare. *Varieties*.—1. Those affecting the infra-vaginal portion of the cervix, *i. e.*, growing from the lips of the os; 2. Those which affect the supra-vaginal portion of the cervix. The *infra-vaginal* cervical fibroids may be mistaken for uterine polypi. They greatly distort the lip from which they grow, and almost totally obliterate the other lip by pressure. The *supra-vaginal* cervical fibroids generally grow into the broad ligaments or behind the uterus, and resemble the intra-ligamentous fibroids.

ETIOLOGY OF FIBROID TUMORS.—Unknown. They increase under the stimulus of undue uterine congestion, and are also dependent upon the functional activity of the genital organs of the woman, for they occur only during the active sexual life of the woman, and cease to grow and atrophy at the menopause. Sexual intercourse always aggravates their symptoms. *Sterility* is a predisposing cause, the tumor being most common in old maids and barren wives. The *age* of greatest liability is between thirty and forty.

SYMPTOMS.—Of three kinds: 1. Those that originate in the uterus itself (*uterine*); 2. Those produced by the pressure of the tumor upon neighboring organs; 3. Those manifested by the general system (*constitutional or remote symptoms*). 1. The *uterine symptoms*.—Menorrhagia; irregular hemorrhages; painful menstruation; sterility and abortion; leucorrhea. *Hemorrhage* is the most characteristic symptom. The size of the tumor does not influence the severity of the bleeding; in some small tumors the bleeding is greater than in others of monstrous size. The location of the tumor determines the hemorrhage; it is greatest in the sub-mucous variety, less in the interstitial, and least in the sub-peritoneal. Large pedunculated sub-peritoneal fibroids are frequently accompanied by hemorrhage, which may be due to one of two causes: to the co-existence in the uterine wall of a small interstitial or sub-mucous tumor; or it may result from pressure upon the pelvic vessels, together with uterine displacement, increasing the congestion and consequent uterine hemorrhage. The hemorrhage is generally periodic (*menorrhagia*), and this will gradually increase until there is almost constant bleeding with monthly exacerbations. The menorrhagia is due to increase in size of the uterine cavity, and consequently of the area of the mucosa, and to the endometritis. *Leucorrhea* is most profuse in those cases accompanied by the glandular form of endometritis. It is not distinctive. *Uterine pain and dysmenorrhea* are not constant. Many fibroids are absolutely unattended with pain. The sub-mucous variety, however, is apt to excite uterine contraction with violent labor-like pains, which are increased at the

menstrual period. In other cases dysmenorrhea results from increased congestion of the tumor at the menstrual periods. *Sterility* is a frequent result of fibroid tumors. This may be due to occlusion of the uterine canal by the tumor, to the profuse leucorrhea, to hemorrhage, or to distortion of the uterus. If conception occur, abortion usually results. This is due to the unequal expansibility of the uterine walls and to the endometritis, which prevents the product of conception from adhering firmly to the endometrium. 2. *Pressure-symptoms*.—Most common is frequency of micturition from pressure upon the bladder. Pressure upon the urethra produces difficulty of micturition or retention of urine. Pressure on the rectum occasions constipation, hemorrhoids, or complete obstruction of the bowel. *Constitutional Symptoms*.—Chief is the anemia due to the repeated loss of blood. It is stated that in many cases of fibroid sudden death from syncope has occurred from fatty degeneration or from atrophy of the heart.

PHYSICAL SIGNS.—Bimanual examination generally shows an enlarged irregular uterus. The surface usually contains lumps or protuberances. If the tumor is subperitoneal and pedunculated, it may be felt in the abdominal cavity as a hard solid mass attached to the uterus, and moving when the latter is moved. The body of the uterus and the cervix are very much harder than usual, and the uterus is increased in size; the sound passes from four to six inches or more. The canal of the uterus is very tortuous, and occasionally the sound cannot be passed at all.

DIAGNOSIS.—Absolute diagnosis is impossible until the tumor has attained an appreciable size. Small fibroid tumors in the anterior and posterior wall of the uterus may be mistaken for *anteflexion* or *retroflexion*. Bimanual examination, however, will reveal two masses—the fundus and the fibroid mass. The introduction of the sound will also show that the fibroid tumor is not the fundus of the uterus. The diagnosis of a large fibroid tumor from the *pregnant womb* is often difficult. Many of the symptoms of pregnancy may be present, and the woman may believe herself pregnant. The cervix, however, in fibroid is never so soft as in pregnancy, and it is not so continuous in outline

with the lower segment of the womb as in pregnancy, but projects abruptly like the nipple on a distended breast. The vagina, also, does not become discolored in fibroid tumor. The pregnant womb grows rapidly and shows intermittent contractions; the fibroid tumor grows slowly. The two conditions may co-exist; hence a sound should not be introduced unless the existence of pregnancy be absolutely excluded. If necessary, anesthetize the patient to complete the diagnosis. In the case of fibrous polyp, the diagnosis must be made between an *inverted uterus* and a uterine polyp. The round projecting tumor of the former has not the same hardness upon pressure as the uterine fibroid; moreover, there is no fundus to be felt, and the sound will not pass beyond the collar of the projecting fundus, while in uterine polyp the cavity measures the normal two and a half inches. The diagnosis of *cystic fibroma* from *ovarian cyst* is often difficult. The chief points upon which the differential diagnosis depends are: the attachment of the cyst, in case of cystic fibroma, to the uterus, and the fact that other fibroid masses may be felt upon the uterus or in the abdomen. In certain forms of interstitial fibroids which project toward the uterine cavity and in submucous fibroids, in order to make a certain diagnosis an intra-uterine examination may be necessary. This can be best made during a menstrual period when the cervical canal is more or less dilated.

PROGNOSIS.—Usually, but not always, the tumor ceases to grow at the menopause. On the other hand, the tumor may take on renewed growth at this time, or the menopause may be delayed for years, the patient dying of exhaustion before nature can effect a cure. In very rare cases the tumor may disappear spontaneously, as after labor or abdominal section. Spontaneous expulsion of the tumor may occur: 1. By pedunculation and extrusion as a uterine polyp; 2. By enucleation, the tumor being shelled out of its capsule *en masse* (occurs in the submucous and interstitial varieties); 3. By breaking down of its substance and expulsion in fragments. Though rarely causing death directly, fibroid tumors are by no means harmless growths. Least harmful is the subperitoneal, next the interstitial;

most dangerous are the submucous and intraligamentous varieties. *Cause of Death*:—1. Exhaustion from hemorrhage; 2. Uremia from pressure upon the ureters; 3. Septicemia; 4. Heart-failure, due to degeneration of the heart-muscle; 5. Some of the accidents of pregnancy complicated by the presence of the tumors; 6. Intestinal strangulation; 7. Some of the forms of degeneration of the growths; 8. Sarcomatous or cancerous degeneration.

TREATMENT OF FIBROID TUMORS.—1. *Medicinal*.—Valueless. No medicine yet known can cure a fibroid tumor of the uterus. 2. *Electrical Treatment*.—This consists in passing a current of electricity through the fibroid, one of the poles of the battery being applied to the abdomen by means of a large moist clay electrode or other proper medium, and the other pole being introduced into the uterine cavity in the form of a platinum or carbon sound, which is insulated with celluloid or rubber over the part that does not enter the uterine cavity. The electrode is pushed into the substance of the tumor after preliminary puncture where it is necessary to hasten the denutrition of the neoplasm, or when the cervix is impermeable or inaccessible. Another method of applying electricity is to pierce the tumor in two places, either through the vagina, rectum, or abdominal wall, and pass the current directly through the growth in that way. The electrical treatment is not curative, and has resulted in many deaths. 3. *Palliative Treatment*.—Employed only when operation is refused, or an effort is made to tide the patient over until the menopause. The chief symptom to deal with is hemorrhage, and the drugs for this purpose are ergot, potassium bromide, gallic acid in large doses (20–30 grains every 2, 3, or 4 hours), and hydrastis. A saline cathartic should be administered a day or two before the appearance of the menses, in order to relieve the precursory pelvic engorgement, and the patient should remain in bed during the menstrual period. If there is much anemia, iron is required during the intermenstrual periods, best administered in combination with ergot (equal parts of tincture of the chloride of iron, dilute phosphoric acid, fluid extract of ergot, and the tincture of cinnamon, a teaspoonful of which is taken after

each meal in a wineglassful of water). If the hemorrhage become excessive at any time, a tampon must be introduced into the cervix; a long narrow strip of lint soaked in vinegar being used for the purpose. This should be left in place for 24 hours. A better plan would be to introduce a sponge tent, which may be kept in for two or three days. A curious fact is, that whatever dilates the cervical canal of a womb containing a fibroid tends to lessen the frequency and duration of the hemorrhagic attacks. In some cases it may be necessary to curette the intra-uterine surface thoroughly, or, this failing, to incise the cervical canal, which also, for an inexplicable reason, produces a cessation of the bleeding. A bistoury may be used, the whole cervical canal being divided on both sides or at several points around the circumference. Finally, in alarming hemorrhages, *Dr. Atlee's method of treatment* may be resorted to. After well dilating or incising the os uteri, a long-handled knife, curved and probe-pointed, is passed into the uterus as far as the guiding finger will reach, and drawn firmly down over the projecting tumor, freely dividing the mucous membrane and its capsule, and cutting into its substance to the depth of about half an inch. This incision severs the superficial bloodvessels, and thus lessens the vascular supply. It also aids in producing self-enucleation of the fibroid. To *check the growth of the tumor*, there should be total absence of sexual intercourse; the patient should occupy largely the recumbent posture, should wear loose gowns, should lead a somewhat sedentary life, and should take a spare but wholesome diet. In other words, she should become a confirmed invalid.

4. *Operative Treatment*.—Varies with the variety and location of the tumor.

Indications for Operation.—1. Persistent hemorrhage; pressure-symptoms. 2. All intra-ligamentous and cystic tumors. 3. In all cases where the patient is poor and dependent upon her own labor for her livelihood, no matter what the variety of the tumor. If the patient be wealthy, give her the choice of palliative treatment or of operation, explaining to her the course in either case. The *methods* comprise removal of the tumor by the abdomen or *per vaginam*, or the production of a premature menopause, with

its resulting beneficial effects, by the removal of the uterine appendages (*ovaries and Fallopian tubes*). This operation is variously termed *Tait's*, *Hegar's*, or *Battey's operation*, or *castration*, and consists in complete removal of the tubes and ovaries.

A *fibroid polyp* can always be removed *per vaginam*. If the tumor project from the cervical canal, its removal is very simple; if it is still within the uterine cavity, it may be necessary to perform a preliminary divulsion or incision of the cervix. The patient is placed in the dorso-sacral position, the vagina is dilated with a speculum or retractor, the polyp, seized with toothed forceps, is forcibly drawn downward, care being taken not to invert the uterus. The pedicle is then twisted and finally divided by a pair of straight scissors curved on the flat. It is not necessary or desirable to cut the pedicle high up. By a lower section close to the tumor, the risk of secondary hemorrhage is diminished, and the stump retracts within the cavity of the uterus and is rapidly obliterated. *To check subsequent hemorrhage*, administer ergot, give hot water injections, or tampon the uterine cavity with gauze. In using the écraseur for the removal of such tumors, there is danger of perforating the uterine wall. Fibroid polyps usually occur singly, hence this operation generally results in a cure.

In performing *Battey's operation* care must be taken to remove every vestige of the tubes as well as the ovaries, otherwise the operation will not be a success. The operation is often difficult on account of adhesions and the great size of the bloodvessels. *Indications for the operation of castration*.—1. Tumors occurring in young women. 2. The early stage of any fibroid tumor. 3. Fibroid tumors that are becoming intra-ligamentous. *Contra-indications to the operation*.—1. When there are urgent pressure-symptoms. 2. A large size of the tumor, for fear of resulting edema and gangrene in the substance of the growth. 3. Fibrocystic tumors, on account of their rapid growth. 4. Telangiectatic tumors. 5. Myomatous and edematous tumors. *Mortality of the operation*.—From 1 to 5 per cent.

For complete removal of the growth *vaginal* or *abdominal hysterectomy* may be performed. Very small fibroid uteri

with their annexed tumors may be removed *per vaginam*. Usually, however, *supra-vaginal hysterectomy* is the operation performed. This may be done in two ways: *With the extra-peritoneal treatment of the stump*, the latter being left outside of the abdomen in order to have perfect control of any subsequent hemorrhage; or with the *intra-peritoneal treatment of the stump*, in which case hemostasis is rendered complete and permanent by ligation or occlusion of the vessels within the abdomen, and the stump is closed by approximation of the peritoneal surfaces and left within the peritoneal cavity as the stump of an ordinary ovarian cyst. The latter is a more surgical and a neater operation. The extra-peritoneal method is still used by surgeons of the greatest ability, who obtain with it good success.

Steps of Supra-vaginal Hysterectomy, Extra-peritoneal Method.—Abdominal incision in the median line between the umbilicus and symphysis pubis, followed by thorough exploration of the form, size, and attachments of the tumor. 2. Lifting out of the tumor directly by the hand, or by the use of a corkscrew. 3. Ligation of the ovarian arteries on the uterine and pelvic sides by double ligatures. Around the stump of the fibroid mass a temporary rubber ligature (solid rubber cord) may now be passed, to control all bleeding. 4. A permanent clamp (either the Kœberle nœud or the Tait nœud) may now be applied around the tumor and the latter cut away, leaving a more or less conical stump, so that the peritoneum may be thrown over the fibrous portion of the pedicle. The rubber ligature may then be removed or not. 5. Two skewer-like pins are thrust through the pedicle, the points being shod with protectors. These prevent falling back of the stump within the abdomen. 6. Closure of the peritoneum, by stitching around the stump of the cervix, and closure of the abdominal incision by another row of sutures. The nœud generally comes away by sloughing of the stump in from 2 to 3 weeks. *Danger of Operation.*—Inclusion of the ureters in the nœud.

Intra-peritoneal Method.—1. Ligation of the ovarian arteries on the uterine and pelvic sides. 2. Division of

the broad ligaments as far as these ligatures extend. 3. Ligation of the uterine arteries within the broad ligaments at about the level of the internal os uteri. 4. Separation of the uterus from the infra-vaginal portion of the cervix, by cutting through the broad ligaments to the level of the internal os, and a wedge-shaped incision through the cervical tissue, so that the two flaps of the resulting stump may be brought together and the peritoneal surfaces approximated by two or more rows of sutures. *Mortality of Supra-vaginal Hysterectomy.*—In the best hands five per cent. for either method.

X. The Fallopian Tubes.

ANATOMY.—The tubes are continuous with the superior angles of the uterus, posterior to the points of attachment of the round ligaments, and occupying the free borders of the broad ligament. Each tube has an expanded outer end, the *infundibulum* or *fimbriated extremity*. The thick portion of the tube continuous with the infundibulum is the *ampulla*; the *isthmus* is the straight narrow portion of the tube which at its internal end opens into the uterine cavity. The lumen of the isthmus will barely admit a bristle. The average length of the tube is from four to six inches; the right is frequently longer than the left. The thickness of the walls of the tube varies inversely with the size of its lumen. The isthmus is directed outwards and slightly upwards; the ampulla descends, passes behind and external to the ovary, and then turns its ostium or mouth upwards, so that the fimbriæ are in immediate contact with this gland. The upper part of the broad ligament which passes over the Fallopian tube and holds it in position is called the *meso-salpinx*. Radiating upward from the ovary toward the Fallopian tube in the meshes of the meso-salpinx is a series of tubules, the *parovarium*, a rudimentary structure consisting of the persistent excretory ducts of the Wolffian body. This structure occasionally undergoes cystic degeneration. The *structure* of the Fallopian tube is mainly unstriped muscular tissue continuous with that of the uterus,

and arranged in an outer longitudinal and an inner circular layer. Two-thirds of its circumference is invested with peritoneum. The lumen of the tube is lined with mucosa covered with ciliated columnar epithelium. This mucosa is disposed in longitudinal folds or plicæ which increase in thickness on approaching the end of the tube, where they branch and become continuous with the fimbriæ; a secretion of mucus takes place from this mucosa. The *tubo-ovarian ligament* extends from the ovarian border of the ostium to the ovary, occupying the free border of the mesosalpinx. It is traversed by a longitudinal furrow. The *abdominal ostium* of the tube varies in shape and size; there may also be accessory ostia or supernumerary mouths. Small stalked or pedunculated cysts are occasionally found upon the Fallopian tubes. The *true hydatid of Morgagni* occurs in about eight per cent. of women. It is the occluded distended end of the duct of Müller, and is attached to the fimbriæ, or in some instances to the tube itself. It is rarely larger than a pea, and is lined by a mucosa covered with a single layer of ciliated columnar epithelium. Its wall is always composed of muscular fibers arranged circularly and longitudinally. Its outer membrane is the peritoneum. Its stalk is always muscular, and its contents consist of clear, limpid fluid. The other form of pedunculated cyst found in this region grows from the parovarian tubules, and is usually one of *Kobelt's tubes*. Its stalk is not muscular, but fibrous, and the interior of the cyst is lined by cubical epithelium.

DISEASES.—*Inflammation of the mucosa—Salpingitis.*—Exceedingly common, and generally *secondary* to septic or gonorrheal endometritis. *Grades of inflammation.*—From a simple catarrh, extending from the mucosa of the uterus and causing no characteristic symptoms, to a purulent inflammation resulting in abscess of the tube. Generally the inflammatory process extends to the fimbriæ and ovary. Adhesions form, closing the abdominal ostium and thus shutting off the peritoneal cavity. After any grade of inflammation it is rare for resolution to occur and the tube to become normal.

Varieties of Inflammation of the Fallopian Tube. These are described under the pathology.—1. Simple catarrhal

salpingitis. Secondary to mild inflammation of the endometrium. 2. Salpingitis with occlusion of the ostium, but without distention. 3. Various forms of cystic distention of the tube, produced by occlusion of the uterine end (*pyosalpinx*, *hydrosalpinx*, *hematosalpinx*). 4. Tubo-ovarian cysts.

Pathology of Salpingitis.—First Stage.—The tubal tissues are soft, succulent, swollen, friable; the fimbriæ are swollen and succulent. On squeezing the tube a few drops of pus will exude from the ostium. The mucosa is covered with a glutinous pus. The *second stage* of the disease commences with closure of the abdominal ostium. *Causes of Closure of the Abdominal Ostium.*—1. Anything exciting a local peritonitis in the pelvis with adhesions binding down the tube and obliterating the opening (*irritation from a pedunculated fibroid; irritation from a suppurating ovarian cyst or dermoid cyst*). 2. An inflammation starting within the tube and extending to the fimbriated end, the fimbriæ adhering to the pelvic wall, the ovary, or other pelvic structure. 3. In other cases, and most usually, occlusion follows an inversion or invagination of the fimbriæ by an extension over them of the middle (*muscular*) coat of the tube. The rounded margins of the ostium thus formed contract, narrow the orifice, and cohere. On slitting up such a tube the fimbriæ will often be found folded up within it. Generally these methods of closure of the abdominal ostium of the tube occur together, the fimbriæ being invaginated and the tube bound down in Douglas's pouch in a mass of dense adhesions. In some of these cases the uterine end is sufficiently patulous to permit free escape of the tubal contents; in other cases, the mucosa of the tube becomes so swollen that the narrow uterine orifice is obstructed, and a retention-cyst is formed, the accumulated contents being pus, mucus, or blood; such a dilatation of the tube usually occupies the outer two-thirds. The tube both thickens and lengthens and often becomes markedly tortuous. The majority of salpingitic tubes burrow between the layers of the meso-salpinx until the ovary and tube are in contact, the meso-salpinx becoming obliterated. *Microscopic Pathology.*—Infiltration of inflammatory cells of various sizes in mild cases limited to the mucosa, in advanced cases involving also the muscular

coat. In many places the ciliated columnar epithelium is lost; in other places merely the cilia are lost. *Varieties of Tubal Retention-cysts.*—1. *Pyosalpinx*, the occluded tube being distended with pus. The tubal walls become quite thin, and the inflamed tissue adherent to the surrounding structures (*ovary, uterus, intestines, broad ligament*). Slight exertion may cause rupture of the tube with general peritonitis. The dilated tube may form a tumor of considerable size, even measuring eight inches in length and simulating an ovarian cyst. An important fact to be borne in mind is that *when a Fallopian tube becomes distended from any cause the tubal walls gradually become thinner*; the tubes thus form a striking contrast to the uterus, the walls of which always hypertrophy no matter what causes a distention of the uterine cavity. In this way may be distinguished a true pyosalpinx from the rare condition in which there is a collection of pus in a bi-cornuate uterus. *Results of Pyosalpinx and Chronic Salpingitis.*—*A. Chronic ovaritis* from extension of the inflammatory process to the surface of the ovary. This is the usual, if not the only, cause of ovaritis. The first change consists in a thickening of the ovarian capsule; lymph is then effused, and this organizing, extensive peritoneal adhesions are formed. *B. Cystic ovaries.*—The ripe ovarian follicles are prevented from rupturing, enlarge, and form small cystic spaces throughout the ovary. The entire size of the ovary may be that of a walnut or egg, and innumerable cysts, varying in size from a pin's head to a pea, may be scattered through its substance. *C. Tubo-ovarian Abscess*, from absorption of the tissues separating the pus-cyst of the tube from the follicular cyst of the ovary. In these cases the communication between the tube and ovary is usually very small, generally barely admitting a probe. *D. Ovarian Abscess.*—It sometimes happens that while the tube shows signs of chronic interstitial inflammation, the ovary alone presents a purulent cavity; in such cases the tube has probably emptied its purulent contents into the uterus. Infection, however, may take place directly in the ovary through the lymphatic system. Ovarian abscesses that occur independently of salpingitis are generally of tuberculous origin.

Diagnosis of Pyosalpinx.—Many cases are mistaken for typhoid fever and appendicitis, and the latter condition may closely simulate the tubal disease. 2. *Hydrosalpinx*, a collection of watery fluid in the tube. This fluid is generally more or less colorless, but at times has a greenish tint due to the presence of cholesterin; frequently it is the color of chocolate. Hydrosalpinx may result from any form of salpingitis. Many cases of pyosalpinx are undoubtedly converted into hydrosalpinx, and the two conditions may co-exist on opposite sides of the pelvis. The inflammatory changes in and around the tube are not nearly so marked as in cases of pyosalpinx. The excessive stretching of the tube results in marked thinning of the walls; spontaneous rupture frequently occurs. The *shape* of the typical hydrosalpinx is very characteristic. It looks like a large sausage, sometimes pear-shaped, tapering at one end. The ovary always occupies the concave border of this sausage-shaped tumor, and the bent shape of the cyst is doubtless due to the traction exercised by the tubo-ovarian ligament and the meso-salpinx. The tube rarely attains a large size, since as the tube distends the mucous and muscular coats atrophy and leakage occurs; it may vary, however, from a tube no larger than the little finger to one as large as a fetal head. Usually there are very few peritoneal adhesions. Hydrosalpinx is believed to represent a later stage of the disease of which pyosalpinx is an earlier condition, for the following reasons: *a.* Hydrosalpinx is not found in acute cases. *b.* In many chronic cases hydrosalpinx is found on one side of the uterus and progressive pyosalpinx on the other. *c.* The ampulla will sometimes have a hydrosalpinx, while the isthmus contains pus, a hydrosalpinx and a pyosalpinx thus existing in the same tube. *d.* The fluid contained in a hydrosalpinx will sometimes be colorless, but at the same time the recesses of the tube contain caseous and cholesterin products of the retrograde changes which have taken place in the former purulent collection. *e.* The dilated tube in hydrosalpinx may, as in pyosalpinx, communicate with an enlarged ovarian follicle to form a tubo-ovarian cyst, and such a cyst can only have been brought about by

an inflammatory condition which caused the absorption of the septum primarily existing between the adherent tube and ovary. 3. *Hematosalpinx*, a distention of the tube with blood (*very rare*). This does not include cases of tubal pregnancy.

Pelvic Abscess.—A term formerly applied to any collection of pus in the pelvic cavity, the origin of the purulent collection not being definitely known. It was thought that an inflammatory process had taken place in the cellular tissue lying between the two layers of the broad ligaments, and that this inflammation had gone on to suppuration (*pelvic cellulitis, pelvic peritonitis*). It is now known, however, that nearly every case of abscess in the pelvis has as its starting-point an inflamed Fallopian tube; hence the term "*pelvic abscess*" does not indicate the true pathologic condition. The terms are antiquated and should be dropped. *Causes of so-called "pelvic abscess."*—1. Pyosalpinx. 2. Ovarian abscess. 3. Suppurating ovarian tumor. 4. Suppuration of a collection of blood in Douglas's pouch. To these may be added the theoretic possibilities of abscess of the cellular tissue of the broad ligament, produced by a lymphangitis resulting from some septic condition in the upper part of the vagina or the cervix, and also the suppuration and breaking down of a lymphatic gland in the pelvis as a result of a similar condition.

Course of Salpingitis.—The most dangerous form is pyosalpinx, and all the milder forms may become converted into cases of pyosalpinx. In the course of the disease before the abdominal ostium is entirely closed, frequent small leakages of the purulent contents of the tubes occur into the peritoneal cavity, giving rise to repeated attacks of localized pelvic peritonitis, or what the patient calls "*inflammation of the bowels*" (*one of the most characteristic symptoms*). Rupture of the tube may follow any rough handling, as in bimanual examination; or it may occur during straining at stool, in labor, or on any violent exertion. Occurring during labor, it may be mistaken for a puerperal fever or puerperal peritonitis. Pelvic adhesions resulting from any form of salpingitis produce various forms of uterine displacement, usually retroflexion and re-

troversion. In some cases the tube may rupture into the vagina, rectum, intestine (*very common*), or bladder. The pus may also find its way beneath the psoas muscle and be discharged externally upon the thigh. Fistulæ are thus produced, which may last for years, until the patient dies of exhaustion, or they may become seats of tuberculosis; they never heal spontaneously. A not infrequent result of long-standing salpingitis is occlusion of the ureters to a greater or less extent, brought about by the compression resulting from adhesions in the broad ligaments. This gives rise to degenerative changes in the kidneys. Pressure upon the pelvic veins also results in aggravated cases of hemorrhoids, or even in partial obstruction of the rectum. The onset of the menopause may produce a cure from the general atrophy of the ovarian and tubal tissues that occurs then, and the conversion of the pyosalpinx into a hydrosalpinx which ruptures and atrophies.

ETIOLOGY OF SALPINGITIS.—There are two great causes of salpingitis, namely, septic endometritis following labor or abortion and gonorrhea. It may be produced by anything that will produce endometritis, *e. g.*, subinvolution; flexions of the uterus; fibroid tumors; cancer of the uterus or of the cervix (it occurs in not less than 10 per cent. of the cases of uterine cancer.—Middlesex Hospital); the use of a septic uterine sound; the use of the stem pessary; operations on the cervix and in the uterine cavity without proper asepsis; the use of sponge tents and cervical and vaginal tampons; syphilis, occasionally. *Gonorrhea* as a cause of salpingitis is very often overlooked on account of the insidious onset of this specific disease. The gonorrheal virus may remain latent for several months in the vulvo-vaginal gland, and only give rise to the salpingitis after a miscarriage or labor. In other cases the gonorrhea can be communicated directly to the uterus without the vagina being affected at all. It may also be communicated to the woman during her pregnancy, and in such cases frequently results in the death of the ovum, septic peritonitis, and death of the patient.

SYMPTOMS OF SALPINGITIS.—Often obscured by the accompanying pathologic conditions (*endometritis, ovaritis*).

Acute Stage.—Fever; increased frequency of pulse; distention of the abdomen; tenderness over the abdomen; dorsal decubitus with the knees drawn up. *Physical Signs.*—Undefined fulness in each lateral fornix of the vagina and in Douglas's pouch; the uterus more or less immovable, and often retroverted or retroflexed. *Chronic Stage.*—Most commonly met with. The chief symptoms are pain, dysmenorrhea, menorrhagia, a history of repeated attacks of pelvic peritonitis, and sterility. The *pain* may be unilateral or bilateral, is generally constant, and is increased by motion, by straining at stool, heavy lifting, by riding over rough roads, and by coitus. It is referred to the ovarian regions. It is not dependent upon the size or character of the tubal tumor. Severe pain may be experienced when there is no distention of the tube, while a large pyo-salpinx in the late stages may be accompanied by very little pain. The dysmenorrhea generally occurs one, two, or three days before the menstrual flow, and is of an agonizing character; it may last throughout the period or cease on the establishment of the flow. *Menorrhagia* is a very general symptom; the flow often lasts from seven days to two weeks, and may be excessive. The repeated attacks of *pelvic inflammation* are due to leakage of the tubal contents into the peritoneal cavity. *Sterility* is universal in these patients on account of the obliterated lumen of the tubes in some cases, and the loss of the cilia in others. In the latter class of cases the ova lodge in the tube and, becoming impregnated, result in a tubal or extra-uterine pregnancy. *Physical Signs.*—Best obtained during the intervals between the acute attacks of the disease. The examination should be made with care, to avoid giving pain, and to escape rupture of a tubal or ovarian cyst. The uterus is found more or less fixed by pelvic adhesions, and generally retroverted and retroflexed, the fundus being bound down in Douglas's pouch; on either side of the uterus or behind it may be felt irregular masses, consisting of the distorted, convoluted tubes and enlarged, indurated ovaries. The ovaries are prolapsed and adherent and often contain small follicular cysts. If the tubes are distended they present sausage-shaped masses; if not distended they may be felt close to

the uterine cornua and extending for half an inch or an inch as firm, cord-like structures.

DIAGNOSIS.—1. Between a *hydro-salpinx* and a *pyo-salpinx*. Often difficult, but of no great importance, since the treatment of both is the same. A case of pyo-salpinx generally has a recent history of acute attack of pelvic peritonitis, whereas hydro-salpinx has no such history, the fluid, if it does escape into the peritoneal cavity, not producing peritonitis. A pyo-salpinx is attributed to a recent gonorrheal or puerperal infection. In pyo-salpinx the adhesions are denser and more general, and it is more difficult to map out the distinct shape of the tumor than in the case of hydro-salpinx. 2. Between *hydro-salpinx* or *pyo-salpinx* and *small ovarian cysts*, *small parovarian cysts*, and *early tubal pregnancy*. The latter conditions are generally accompanied by slighter inflammatory symptoms and by fewer adhesions than is the tubal disease, and they also present quite distinct histories. However, the diagnosis is unimportant, for the treatment of all these pathologic conditions is the same. 3. Retroflexion and small uterine myoma may be mistaken for pyo-salpinx, and *vice versa*. 4. Cancer of the sigmoid flexure of the colon and abscess from appendicitis may be mistaken for pyo-salpinx. It is often very difficult to distinguish an appendicitis from a right tubal abscess, for the tube may rise as high as the cecum, and the appendix and tube may closely adhere to one another. The differential diagnosis will depend largely upon the history of the case.

TREATMENT OF SALPINGITIS.—There is but one radical plan of treatment for chronic salpingitis, namely, *removal* of the uterine appendages. *Indications for Operation*.—In some cases this is demanded on account of the urgent character of the symptoms, as in certain cases of pyo-salpinx. The operation should be performed *in all cases where there is a distinct cystic tumor in the pelvis* and *in cases of salpingitis without the formation of cystic tumors if the salpingitis be of gonorrheal origin*. The so-called “pelvic abscesses” should never be opened through the vagina. The *dangers* of such a procedure are the injuring of a large vessel, of a ureter, or of a loop of adherent intestine. Moreover, these

abscesses usually consist of several cavities (as in the case of the tubo-ovarian abscess), and by puncturing through the vagina the tube or the ovary may be opened and the remaining pus collection be left. Finally, once opened *per vaginam*, a sinus is left communicating with the diseased mucosa of the Fallopian tube, and this may persist for years until the patient's death, or until cured by an abdominal operation. *In every case of pelvic abscess first open the abdominal cavity.* If then the adhesions are such that the abscess-cavity cannot be removed by abdominal section, it may become necessary to make a vaginal opening for drainage. The existence of a fistulous opening into the vagina, bladder, rectum, or intestinal tract is no contraindication to abdominal section and removal of the tube; on the contrary, it is rather an urgent indication, for nothing is so exhausting to the patient as this constant drain of a pelvic abscess through the intestinal tract. In some cases of very large purulent collection it may become necessary to stitch the abscess-wall to the abdominal wound, draining away the pus, and packing the cavity, gradually bringing about obliteration in this way (*rare*). Having removed the diseased tissues, thoroughly irrigate the pelvis with hot water, and drain with a glass drainage tube or with gauze.

Technique of the Operation of Celiotomy or Laparotomy—Instruments.—Four or five hemostatic forceps; knife; a pair of scissors; an aneurysm needle with which to transfix the pedicle; a couple of straight needles. *Steps of Operation.*—1. Incision in median abdominal line about half way between the umbilicus and the symphysis pubis, from two to three inches in length. 2. Introduce two fingers into the abdominal cavity and determine the position of the fundus uteri. From this the fingers are passed out on the posterior surface of the uterus and the broad ligaments until the position of each uterine appendage is determined, together with the amount and strength of the adhesions. 3. The most diseased appendage is next enucleated from its bed of adhesions. The most difficult side is chosen first, in order that less strain shall be put upon the pedicle during the enucleation of the other side. The efforts at enucleation should be applied only to the POSTE-

RIOR SURFACE of the broad ligament from behind forward and from below upward. To enucleate upon the anterior surface it would be necessary to break through the entire thickness of the broad ligament, whereas proceeding from the posterior surface, the tube and ovary are rolled up from their pathologic position. 4. Ligation of the pedicle, the tube and ovary having been freed from their adhesions. The pedicle is transfixed by the aneurysm needle armed with a double ligature of strong silk. The pedicle is tied in two halves, the ligatures which tie these halves being crossed in the middle so that they form a figure-of-eight. This crossing is done in order that there may be no division of the pedicle, from which subsequent bleeding may take place. The tube should be tied as near to the cornua of the uterus as possible. It is important to do this, because a small section of tube left may result in a partial tubal abscess, necessitating a subsequent operation. It is also important to remove every portion of ovarian tissue. A small amount of ovarian tissue left may keep up menstruation and may prevent the coming on of the menopause; it may also undergo cystic degeneration and necessitate a subsequent operation. In cutting away the tube and ovary a considerable button should be left in order that the ligature may not slip over the stump. 5. Checking of bleeding from torn adhesions. Usually this stops on ligating the pedicle. If it does not, the pelvis should be packed with sponges, or pressure should be made with a sponge and sponge-holder. 6. Irrigation of the pelvis to remove blood and cystic and tubal contents. For this purpose clean hot water perfectly distilled, at a temperature of 110° or 115° . 7. Drainage only in those cases in which septic substance has been introduced into the peritoneal cavity. The best means of abdominal drainage is the straight glass tube.

Certain cases of salpingitis do not demand radical treatment, especially those in women who are approaching the menopause, and whose only symptoms are slight pain and some increase in the length of the menstrual period. In such cases we may wait for the menopause, trusting to the atrophic changes which occur at this period to bring about

an atrophy of the diseased organs. In other cases the women may suffer intensely, but are approaching the menopause. In these cases we must be influenced by the amount of suffering to which the woman is subjected, by her social position, and by her means of existence. Then, again, the altered relations brought about by this disease between husband and wife must be considered in deciding upon a plan of treatment. Sexual intercourse in these cases may become impossible on account of the intense suffering produced, and much domestic unhappiness may follow.

Palliative Treatment.—This consists in the avoidance of any exercise which may produce the pelvic pain; in rest, especially during the menstrual epochs; in keeping the bowels patulous, preferably with saline purgatives, to diminish pelvic congestion; in applications of Churchill's tincture of iodine to the vaginal vault; in depleting the pelvic vessels by scarification of the cervix uteri or by glycerin tampons; in the use of frequent large vaginal douches of hot water.

The Removal of One or Both Appendages.—This is an important question. In many cases one tube appears to be absolutely normal, while the other is diseased. Shall one or both be removed? To a great extent the answer should be left to the wishes of the woman. If she be young, without children, and desirous of offspring, the healthy tube should be left. Always determine the question with the patient and her husband before the operation. The reason why it is sometimes desirable to remove a healthy tube when the other side is diseased, is that the focus of disease which brought about the salpingitis in one tube may also act upon the other; especially is this true of gonorrheal cases. In any case in which there is a collection of pus in one Fallopian tube the other should be removed, whether diseased or not, and in any case of unilateral salpingitis accompanied by an obstinate and purulent form of endometritis both sides also should be removed. If the unilateral operation be performed a perfectly favorable prognosis in regard to permanent recovery, or even in regard to future freedom from danger of death, cannot be given. In every case of pronounced tubal disease it is

probably advisable to remove both appendages, unless the patient and her husband are very desirous of offspring. If the tube be left, the probable return of the disease should be explained.

Complications.—1. In cases of gonorrheal tubal disease the accompanying intractable form of endometritis may bring up the question of removal of the uterus as well as the appendages. This removes an organ that is functionally useless after the removal of the tubes and ovaries, and also takes away the source of the leukorrhea, which is so annoying to the woman. 2. In those cases in which fistulous openings communicate with the rectum or bladder, it is not always possible to close them. They exist in a dense mass of friable tissue, and there is not even any normal peritoneum left upon the surface of the intestine which can be drawn over the opening. In such cases drainage with gauze or the glass tube will carry off the discharges until adhesions have closed the fistulous openings. Often in such cases a discharge of feces may persist for a few days, or even several weeks, from the abdominal incision. This generally ceases of itself unless the diseased portion of intestine is placed in such a position that a kink is formed in it.

Mortality of Celiotomy.—Under 5 per cent. for the removal of the appendages for all sorts of inflammatory conditions.

TUBERCULOSIS OF THE FALLOPIAN TUBES.—Rare. When tuberculosis is present in the genitalia it usually starts in the tubes, and from them is transmitted to the ovaries, or more rarely to the uterus and general peritoneal cavity. It is said (Williams, *J. Hopkins Hospital Reports*, that 18 to 20 per cent. of all appendages removed for inflammatory disease are tuberculous. *Reasons for Predilection of Tubercular Lesion for the Tubes.*—The plicated mucous lining, which is not subject to the menstrual sloughing like that of the uterus, forms an admirable resting-place for the bacilli. The intense vitality of the uterine mucosa and its partial desquamation at the monthly period forms the principal defense against the bacilli. *Varieties of Tubal Tuberculosis.*—1. Primary. 2. Sec-

ondary to tubercular degeneration of other organs. The frequency of primary tuberculosis compared with secondary has been stated to be about 14 or 15 per cent. *Mode of Invasion in Primary Tuberculosis.*—Very difficult to determine. The external communications of the female genitals would seem to admit of their frequent infection either through the atmosphere, the introduction of infectious bodies, or of tuberculous semen. Infection is especially liable to occur after labor. The *secondary* form of genital tuberculosis, or that which is developed in the course of tuberculous degeneration of other organs, is much more common than the primary. It frequently occurs in the course of phthisis. *Mode of Development of Secondary Tuberculosis.*—1. By metastatic infection by means of the blood or lymph. 2. By direct conveyance of the infecting material from the primary focus (or the lungs) in the sputum. 3. Tuberculosis of the tubes may result from a primary infection of the peritoneum, or the tube may be infected by the adhesion of a loop of tuberculous intestine, or the genital apparatus may become infected by tuberculous urine flowing from tuberculous kidneys.

Pathology.—Tuberculosis of the Fallopian tube, whether primary or secondary, is sometimes recognizable to the naked eye by the increased size of the organ, by the slight transparent or yellow granulations upon its surface or in its muscular walls, and by its contents. The tube is dilated and contains fluid which is more or less fusiform and caseous. Koch's bacillus cannot always be found.

Symptoms.—Those of non-tuberculous inflammation of the tube. A certain diagnosis is impossible. Tubercular salpingitis is often accompanied by general tubercular peritonitis. The latter disease may occur independently of tuberculous disease of the Fallopian tubes, but in 30 to 40 per cent. of the cases of tubercular peritonitis, the Fallopian tubes are found to be affected, and in the greater number of these cases the peritoneal trouble seems to be secondary to the tubal disease. This is one reason for the greater frequency of tubercular peritonitis in women.

Diagnosis.—Of *encysted tubercular peritonitis from ovarian cyst* is always difficult and very often impossible.

There is generally a history in the tuberculous disease of obscure abdominal pains, irregular febrile attacks, and more gastro-intestinal disturbance than generally accompanies the slow and painless evolution of ovarian cysts. The temperature chart is of great assistance, as high or very low temperatures commonly occur in this disease. The local physical signs are even more deceptive and less valuable than the history and symptoms. They are almost identical in the two conditions.

Tumor-like Formations in Tubercular Peritonitis.—May complicate a diagnosis. *Varieties.*—1. They may be omental tumors; (2) sacculated or encysted exudations; (3) retracted and thickened coils of intestine; (4) enlarged mesenteric glands. When the *omentum* becomes affected it forms an elongated, firm mass attached to the transverse colon, and lying across the upper part of the abdomen. *Sacculated exudations* are the most common of the abdominal tumors produced by tuberculous disease. The sacs are formed by adhesions between the intestinal coils, the parietal peritoneum, the mesentery, and the abdominal or pelvic organs. *Retracted and thickened intestinal coils* may form a mass of great distinctness, and even lead to the diagnosis of a tumor. *Enlarged mesenteric glands* may be mistaken for other forms of abdominal tumor.

Treatment.—Immediate removal of the tubes and ovaries. The presence of tubercular peritonitis should hasten the operation. The simple opening of the abdomen, with cleansing and draining of the peritoneal cavity, may result in a cure. The cause of this therapeutic change following laparotomy, though universally recognized, has not been explained. Those cases in which there is a fresh eruption of the tubercles with considerable effusion, whether free or sacculated, offer the best chance of recovery. Spontaneous resolution of omental tumors has been known to occur. In all cases the chances of operation should be given.

XI. The Ovaries.

ANATOMY.—The ovary is a small oval-shaped body about the size of an almond, situated in the posterior layer of the broad ligament; its weight varies from sixty to one hundred and thirty-five grains. It has an anterior and posterior border, and an upper and a lower surface. The average longitudinal diameter of the ovary is one and one-third inches, its transverse diameter is three-fourths of an inch, and its perpendicular diameter, or thickness, is three-eighths of an inch. The smoothness of the surface of the ovary is interrupted by prominences caused by ripening follicles, and by scars which indicate the spots where follicles have ruptured. The external covering of the ovary is directly continuous with the posterior layer of the broad ligament. The posterior border is convex and free; the anterior, or hilum, is flattened and attached to the broad ligament; the blood-vessels which supply the organ enter at this point. The ovary is held in its position by certain peritoneal folds which form ligaments, and by the fact that it floats at a certain level on account of its own specific gravity. The *ovarian ligament* runs from the cornu of the uterus just below the uterine origin of the Fallopian tube to the inner end of the ovary. It is about one and one-quarter inches long, and is a longitudinal fold of the peritoneum, into which the unstriated muscular fiber of the uterus is prolonged. The *infundibulo-pelvic ligament* is about one inch long, and runs from the outer end of the Fallopian tube to the side wall of the pelvis. It is simply that part of the upper margin of the broad ligament unoccupied by the Fallopian tube. The *tubo-ovarian* ligament runs from the fimbriated extremity of the tube to the outer end of the ovary. *Microscopic Anatomy.*—The ovary is covered with a columnar epithelium (the *germ epithelium*), consisting of nucleated cells with a dull luster. It is continuous with the squamous epithelium of the peritoneum, the line of contact being marked by a whitish elevated line. The ovary consists of the *oöphoron*, or parenchyma of the organ, that part forming its free border, and the *paroöphoron*,

that portion of the ovary in relation with the hilum of the organ. The oöphoron is the egg-bearing segment, and is full of Graafian follicles in various stages of development, maturation, and decay. The ripe follicles may be recognized by their size, and the recently-ruptured follicles usually present themselves as *corpora lutea*, so-called in consequence of their peculiar yellow color. The paroöphoron never contains follicles. It is usually composed of fibrous tissue traversed by numerous blood-vessels. In young ovaries it may present remnants of gland tubules which are vestiges of the Wolffian body. These tubular structures are directly continuous with the tubules of the parovarium.

In the human fetus there are two structures from which the future urinary and sexual organs are to be developed. These are the ducts of Müller and the Wolffian bodies. In the female the ducts of Müller form the Fallopian tubes, uterus, vagina, and the hydatid of Morgagni. The Wolffian bodies do not develop in the female, but traces of them are normally found in the broad ligament, forming the parovarium, and occasionally traces extend into the hilum of the ovary.

The *parovarium* consists of 12 to 20 narrow tubules situated between the layers of the meso-salpinx and closely associated with the paroöphoron. These tubules radiate from the ovary to join the longitudinal tubules situated at right angles to them. Each tubule is distinct, ends blindly, and is usually lined with epithelium. The parovarium is homologous with the vasa efferentia and the epididymis of the testicle. It consists of three parts: an outer series of tubules, free at one extremity, known as *Kobelt's tubes*; an inner set, termed the *vertical tubules*, and a large tube, running at right angles to the vertical tubules, which may occasionally be traced downward into the vagina. This is *Gärtner's duct*, and it corresponds to the vas deferens in the male.

CYSTIC TUMORS OF THE OVARY AND PAROVARIIUM.—
Origin.—In the oöphoron cystic growths arise from the mature and from the undeveloped Graafian follicles; in the paroöphoron, from the terminal ends of the tubules of

the parovarium which extend into this structure; in the parovarium, from distention of the tubules.

1. CYSTIC TUMORS OF THE OÖPHORON.—*Varieties of Cysts.*—(1) Small cysts that never attain a large size, arising from the distention and coalescence of the Graafian follicles; (2) *cysts of the corpus luteum*; (3) *multilocular ovarian cysts*, or cysts of unlimited growth, arising from the degeneration of undeveloped Graafian follicles. 1. *Follicular cysts of the ovary.*—When the ovary is the seat of *follicular cysts* it is said to have undergone *follicular cystic degeneration*. This form of cyst is very often the result of salpingitis, from extension of the inflammatory process from the tube to the covering of the ovary. Mature Graafian follicles as a result cannot rupture and small cysts are formed. The simplest form of follicular cyst is, therefore, a retention-cyst, dropsy of the follicle supervening upon its failure to rupture. These follicular cysts may occur in one or both ovaries; they may be small or large, single or multiple, and may form at any age, though most common during the period of sexual activity. The inner surface of the cyst is smooth, and lined with a single layer of cylindrical epithelium. The *contents* are usually pure serum with a specific gravity of 1005–1020. Occasionally hemorrhage takes place into the cyst, a blood-cyst of the size of an English walnut, or a hen's egg, resulting upon the surface of the ovary. Follicular cysts never give rise to serious pressure-symptoms, but may produce pelvic pain of a more or less intense character, and very frequently profuse uterine hemorrhages. The process of menstruation is usually not interfered with.

2. Occasionally a small cyst of the oöphoron may arise from a corpus luteum due to the accumulation of fluid in the ruptured Graafian follicle. Such cysts are usually of small size (marble or cherry), though some have reached the size of the adult head; they can readily be recognized by their position and the peculiar yellow color of their walls. Rare in the human female, they are very common in the cow, ewe, mare, and sow.

3. *Multilocular Ovarian Cysts.*—*Origin.*—Probably the ducts of Pflüger, which are invaginations of the germ-

inal epithelium penetrating into the ovarian stroma and forming the Graafian vesicles. These cysts grow from structures which normally should develop into a Graafian vesicle—they arise, therefore, from a degeneration of an undeveloped Graafian follicle. Such cysts form the ordinary multilocular ovarian cysts, or the proliferating glandular cystoma of the ovary. They differ from the follicular cysts in that their termination is always fatal, *i. e.*, they grow until they kill the patient. The tissue lining the interior of these multilocular cysts varies greatly, not only in different cysts, but in the various cavities of each cyst.

Generally, all epithelium is absent in large cysts; a layer of stratified cells is present in cysts of moderate size; the interior may be clothed with mucous membrane furnished with glands and covered with epithelium; skin, with all its various appendages, may line the cyst wholly or in part (*ovarian dermoid*). In size these cysts vary from an ordinary ovarian follicle to a cyst containing many gallons of fluid.

Multilocular Glandular Cystoma.—Occasionally in those multilocular ovarian cysts that are lined with mucous membrane the epithelium may exhibit active changes, and the cysts become occupied by glandular structures of great complexity. These are called *ovarian adenomata*, or *multilocular glandular cysts*. They have a dense fibrous capsule, the surface of which is frequently lobulated on account of the presence of smaller loculi or of masses of smaller cysts, and they often attain great dimensions. They are composed of innumerable cysts which vary in size from a cavity no larger than a pea to one holding a quart or more of fluid. Three kinds of loculi exist in such cysts: (*a*) The main large loculi lined with the mucous membrane; (*b*) in typical specimens a honeycomb-like mass will be found projecting into some of the larger cavities and occupying usually one-third of its circumference, whilst the cavities occupying this honeycomb portion are secondary retention cysts formed by the occlusion and distention of the mucous glands in the lining membrane of the main loculus; (*c*) loculi without honeycomb-like structures, of small size, and histologically indistinguishable from distended ovarian

follicles. A close relationship exists between all the varieties of cysts of the oöphoron, so close that one tumor in its various parts may represent all the varieties. *Contents.*—The contents of the cavities of multilocular ovarian cysts differ very much, and this difference depends upon the character of the lining membrane of the cavities and the accidents to which the cyst has been subjected in the course of its growth. The contents may be a thin, colorless fluid or thick, tenacious mucus; the fluid may be grumous from admixture with blood. If skin line the cavity the fluid will contain pultaceous matter (formed from shed epithelium), sebaceous matter, epithelial débris, and shed hair. The fluid of the larger cavity is thinner than that of the smaller ones. The liquid of ovarian cysts has a more or less oily consistency, is sometimes viscid, and sometimes syrupy. The *color* varies from a brownish-yellow or apple-green to a coffee, chocolate-brown, or black, the darker colors being due to the presence of decomposed blood. Cholesterin crystals are occasionally found, and in some of the cysts are rice-shaped bodies. The specific gravity of the fluid varies considerably, *but is always above 1010*. The *wall* of the main sac is composed of fibrous tissue, the outer surface being covered by the peritoneum. The thickness of the fibrous coat varies greatly, and is most marked in the neighborhood of the pedicle, where three layers may generally be recognized: an external and internal layer of fibrous structure, and a middle stratum of loose connective tissue. Large arteries are usually found in the middle coat of the cyst-wall, while most of the veins, which are large and muscular, are located in the external coat. The peritoneum is closely adherent to the cyst-wall. *Method of Growth of Multilocular Ovarian Cysts.*—Intraperitoneal; *i. e.*, they grow into the abdominal cavity. The ovary is destroyed in the growth, being spread out upon the wall of the cyst; in cases of large cysts it is almost impossible to detect any ovarian structure. The cysts usually have a distinct pedicle, the hilum of the ovary remaining, as a rule, free from disease. The Fallopian tube is usually distinct, and seldom much increased in length. In about 4 per cent. of the cases *bilateral* multilocular cysts occur.

2. CYSTIC TUMORS OF THE PAROÖPHORON.—As a rule cysts of the paroöphoron are unilocular, and differ from oöphoritic cysts in the following particulars: 1. They do not affect the shape of the ovary until they have attained a considerable size. 2. Their growth is not intra-peritoneal. They always burrow between the layers of the meso-salpinx, and, when large, make their way between the layers of the broad ligament by the side of the uterus. 3. The interior of these paroöphoritic cysts is beset with warts or papillomata, which may vary greatly in number (only a few clusters, or so luxuriant as to cause rupture of the cyst). These warts are very vascular, bleed freely when handled, and are frequently calcified. When they perforate the cyst-wall, they spread over the outer side of the tumor upon its peritoneal surface, and may even extend beyond the tumor and stud all the peritoneal area with which they are brought in contact. They may cover the bladder, uterus, rectum, omentum, and abdominal viscera; they have even been found upon the peritoneal covering of the diaphragm. In some cases the papillæ, instead of breaking through the peritoneal surface, may extend downward beneath the peritoneum and extend into all the surrounding connective tissue. The *fluid* contained in these cysts is usually clearer than that of the oöphoritic cysts, is not of the same glairy character, and is less viscid. An important pathologic and clinical fact connected with these cysts is that when they rupture the fluid they contain is scattered over the peritoneum, carrying with it the papillary infection. Such cysts should never be tapped, for fear of the escape of some of the fluid into the peritoneal cavity, and care should also be taken at the time of operation. These papillary cysts of the paroöphoron are very often accompanied by ascites, especially if the papillomata have extended to the peritoneal membrane. *Growth of Papillary Cysts of the Paroöphoron.*—In the direction of least resistance; *i. e.*, between the layers of the meso-salpinx, and, when they attain large size, between the layers of broad ligament. They consequently become extra-peritoneal cysts. They are not of as rapid growth as the multilocular oöphoritic cysts, but are apt, however, to cause considerable disturbance by pressure and

by the displacement of pelvic organs. They may push the bladder upward, or strip off from it its peritoneal covering. In this way a cyst may force its way into the sub-serous connective tissue of the anterior abdominal wall, and if laparotomy be attempted in such a case, the peritoneum will be reached only after the removal of the intervening cyst. The recto-uterine and recto-vaginal spaces may be invaded, or the growth may force apart the folds of the mesentery, sigmoid, meso-colon or meso-cecum, and come in direct contact with the subserous structures of the small intestine, sigmoid flexure or cecum, and vermiform appendix respectively. Papillary cysts of the paroöphoron *are generally bilateral*. They occur in the double form in about 75 per cent. of the cases. All papillomatous cysts of the ovary are not paroöphoritic in origin. Occasionally they originate in the parovarium.

3. CYSTIC TUMORS OF THE PAROVARIIUM.—Cysts may arise from any part of the parovarium: (a) Kobelt's terminal tubes may undergo slight cystic enlargement, and form stalked cysts which it is very common to find about the tube and ovary in the normal condition, and which are often mistaken for the hydatid of Morgagni. These are of no pathologic significance. (b) The true parovarian cyst arises from the vertical tubules. It is not pedunculated, but remains between the layers of the mesosalpinx and extends into the broad ligament toward the Fallopian tube, which becomes stretched because the abdominal end of the tube is fastened firmly to the ovary by the tubo-ovarian ligament, and the ovary, in its turn, is attached to the side of the uterus. This elongation of the Fallopian tube is a characteristic sign of parovarian cysts. It may reach the extent of fifteen to twenty inches. Notwithstanding this extreme stretching of the tube, the lumen is rarely obstructed, and its abdominal ostium can usually be found. Small cysts of the parovarium are, as a rule, transparent, but when they exceed the size of a cocoanut this transparency is lost, and the walls become thick and tough. The *lining* of the small parovarian cysts is columnar epithelium, at times ciliated; in cysts of moderate size the epithelium becomes stratified, and in large cysts it atro-

phies from pressure. The size is usually small (of an orange or under); they may, however, attain very large proportions and contain several pints of fluid. Parovarian cysts are in a great majority of cases unilocular. Occasionally they undergo papillary degeneration, and then form the variety known as *papillary parovarian cysts*; these clinically exhibit the same destructive and malignant qualities as their paröophoritic congeners. The cyst-wall is usually very thin, differing in this respect from the multilocular ovarian cyst. It is formed of a layer of fibrous tissue containing smaller muscle-fibers, while the outer surface is covered with peritoneum. The peritoneal covering is generally quite movable upon the subjacent stratum of fibrillar connective tissue unless some inflammatory action has taken place. This renders enucleation of the cyst easy. The contents of parovarian cysts are usually a thin, limpid, colorless, and generally opalescent, watery fluid, having a low specific gravity, averaging about 1005 and not exceeding 1010; occasionally the contents are discolored by the admixture of altered blood. Parovarian cysts are not as common as the other forms of cysts, occurring only in about ten per cent. of all cases of cystic growths of the ovary.

RESUMÉ OF CYSTIC TUMORS OF UNLIMITED GROWTH.

I. *Of the Oöphoron.* Multilocular Cysts: 1. Simple; 2. Glandular or Adenomatous; 3. Dermoid.

II. *Of the Paröophoron.* Papillary Cystoma of the Ovary.

III. *Of the Parovarium.* Simple Parovarian Cysts; Papillary Parovarian Cysts.

SECONDARY CHANGES IN OVARIAN TUMORS.—1. *Inflammation and Suppuration.*—*Causes.*—Infection from: (a) the intestinal canal; (b) the urinary bladder; (c) the Fallopian tube (the *chief source*); (d) the accidental admission of air by tapping. Usually it is the tumors of moderate size which remain wedged in the pelvis, and especially cysts with dermoid contents that are most prone to inflammation. It is exceedingly common to find the co-exist-

ence of subacute or chronic salpingitis and adherent ovarian cysts, especially if they are of the dermoid variety. The *result* of inflammation of the cyst-wall is adhesion between it and the omentum, intestines, and parietal peritoneum. *Infection from the intestines* follows adherence of the bowel to the cyst-wall in consequence of inflammatory changes arising in the gut itself. The wall of the intestine thins and allows the intestinal gases to diffuse and cause suppuration. Occasionally the walls of the cysts become so thin that the gas enters the cavity of the cyst, sets up putrefaction, and converts it into a huge abscess. An important mode in which inflammation of the wall of an ovarian cyst is initiated is by *appendicitis*. The appendix vermiformis is in many cases the source of the inflammation. Suppuration is very frequent in small dermoid cysts confined to the pelvic cavity, and many cases of so-called pelvic abscess have been proved to be in reality suppurating dermoids. Suppuration in large ovarian cysts is in most cases due to communication with neighboring viscera (intestines, rectum, bladder, vagina). *Symptoms*.—In acute cases severe, and unless the pus finds an exit the patient dies. Even when the pus finds an outlet, the patient becomes emaciated by the long discharge and is worn out by the suffering. In some cases the tumor may contain gas, either as a result of the decomposition of the ovarian contents, or from its connection with the intestines. A highly tympanitic note in such cases replaces the usual tumor dulness. *Directions of Rupture*.—Into the *peritoneal cavity*, through the *rectum*, *bladder*, or *vagina*, or through the *abdominal wall* near Poupart's ligament. If it bursts into the bladder, cystitis is a most constant accompaniment; vesical calculi may form from the fragments of teeth from a dermoid cyst, a phosphatic deposit forming over them. The firmer the adhesions, the more difficult is the removal of the cyst. Old-standing adhesions usually contain blood-vessels which are often of great size, and which may be sufficient to nourish the tumor.

2. *Torsion of the Pedicle*.—Rotation of the cysts upon their axes, the stalk or pedicle becoming twisted. This occurs in

about ten per cent. of the cases of ovarian and parovarian tumors. This complication is not so common as formerly, probably due to the fact that ovarian tumors are now operated upon at a much earlier stage than formerly. *Cause.*—Obscure. Various explanations have been advanced. It has been attributed to the alternate distention and evacuation of the bladder; to the passage of the feces through the rectum; to sudden movement (fall, slip, or unusual exertion). This accident frequently occurs when ovarian cysts complicate pregnancy. The torsion may occur early in the pregnancy or not until delivery, it then being due, probably, to the rapid diminution in size of the uterus and the movement which this organ, as it sinks into the pelvis, imparts to the tumor. *Effects of Torsion.*—Depend upon the tightness of the twist. The usual effects of *acute torsion* are: (1) passive congestion; (2) thrombosis; (3) extravasation of blood into the tissues; (4) necrosis (*not gangrene*). Severe venous engorgement follows with extravasation of blood into the cyst-wall; the veins may rupture, with hemorrhage into the cavity of the cyst (this may produce profound anemia or even death). If the venous circulation is completely arrested, the cyst, on opening the abdomen, presents a deep, dark, lusterless hue, most intense near the attachment of the pedicle. *Slow or chronic torsion* is the term applied to those cases in which the rotation occurs slowly, so that the pedicle becomes twisted like a rope. Results of *chronic torsion* are inflammation of the cyst-wall, with the formation of adhesions between it and the adjoining viscera (*omentum or parietal peritoneum*). These adhesions nourish the tumor, even when the circulation is entirely cut off through the pedicle. This is called *transplantation of the cyst*, its connection with the uterus being changed to connection with the omentum, intestine, or abdominal wall. This occurs most commonly in dermoid tumors. *Symptoms of Acute Torsion.*—Sudden and violent pain in the abdomen, vomiting, collapse, with ovarian tumor.

3. *Hemorrhage.*—Serious hemorrhage into the cyst-cavity usually follows torsion of the pedicle. It may occur from other causes. It frequently follows the process of tapping. Spontaneous hemorrhage also takes place from

the vascular papillomatous structures which spring from the lining membrane of some cysts. The hemorrhage is *generally* slow and slight in amount, but may be so profuse as to endanger life.

4. *Rupture*.—Rupture of an ovarian cyst is by no means an unfrequent accident. *Immediate Cause*.—A fall or jar; violent coughing; the pains of labor (may be mistaken for puerperal peritonitis). *Predisposing Cause*.—Thinning of the cyst-wall from distention in the growth of the tumor or from fatty degeneration of a portion of the wall. The formation of thrombi in the vessels of the cyst-wall often results in the production of localized patches of fatty degeneration and softening. *Varieties of Rupture*.—1. *Acute*. All of the contents escape immediately into the peritoneal cavity. 2. *Slow form of leakage of cyst contents*. Occurs in those cysts in which the walls are thin and the contents are under great pressure. No ill effects follow this gradual leakage, for the peritoneum is very tolerant of most forms of cystic fluid. The fluid thus escaped into the peritoneal cavity is frequently removed by diuresis. Bleeding at the time of rupture is generally not profuse for the reason that the rupture occurs in an attenuated anemic portion of the cyst-wall. The most dangerous cases of rupture are those which occur in large cysts filled with colloid or papillomatous material and in dermoid cysts. In such cases the general peritoneum is apt to become infected. In rare cases the escape of the colloid contents may be followed by the appearance of tense and vascular masses of a gray or yellow color on the surface of the peritoneum. These secondary growths or jelly-like nodules vary in size up to a hickory-nut; they may become confluent and cover the viscera with a continuous layer of the material. They often contain mucin, and are called *myxomata peritonei*.

RENAL INVOLVEMENT IN OVARIAN CYSTS.—Dangerous pressure on the ureters may occur with resulting hydro-nephrosis and degeneration of the kidney. The presence of albumin in the urine should hasten the performance of an operation in such a case, but it should always influence the prognosis.

ETIOLOGY OF OVARIAN CYSTOMATA.—Nothing is

known as to the ultimate cause of these growths. They occur usually during the period of sexual activity, but may be found at any age, from fetal and infant life to eighty years and over. They most frequently occur in virginal or sterile women.

SYMPTOMS.—None pathognomonic. A rapidly enlarging tumor, starting in one groin, without tenderness or soreness, giving no inconvenience except from its bulk. The general health remains good until the tumor begins to distend the abdomen; then emaciation takes place, strength fails, and the features assume a pinched expression (*facies ovariana*).

PHYSICAL SIGNS.—Made by inspection, palpation, and percussion. The patient should be *undressed*, and placed flat on her back on a bed or couch. The fingers and hands should be warm in palpation to avoid involuntary resistance from the recti muscles. *Inspection* shows enlargement of the abdomen, general or localized to one or other flank when the tumor is of moderate dimensions. The skin may present a brown discoloration and the superficial veins may be distended. On *palpation* the tumor feels firm and resisting; if cystic, its surface is smooth, as a rule; multilocular cysts and ovarian adenomata may have irregular surfaces. Manipulation rarely causes any pain. In large cysts a wave of fluctuation may be produced by placing the flat part of the hand on one side of the abdomen and tapping the cyst lightly on the other side. In multilocular cysts the septa prevent the propagation of this wave throughout the whole tumor; it can only be detected by placing the hand in different positions over the abdomen. The distinctness with which the wave is perceived depends upon the character of the fluid and the thickness of the abdominal walls. Mucous and colloid materials give a less distinct wave than mere fluid contents. A fat abdominal wall may simulate a fluctuation-wave. To overcome this an assistant places the ulnar edge of the hand along the linea alba, while palpation is made on one side of the abdomen and the tumor is tapped lightly upon the other side. *Percussion* shows dulness over the crown and sides of the tumor with resonance in the loins.

Altering the position of the patient does not affect the percussion note. The ring of resonance surrounding the cyst is often called the *coronal resonance*. It is not present in other fluid accumulations in the abdominal cavity. *Bi-manual examination* will generally show a normal-sized uterus displaced to either side, pressed against the symphysis pubis, or very usually retroverted and pressed down into Douglas's pouch. It is generally not adherent, and is movable, except for the pressure of the superincumbent tumor. The lower segment of the ovarian tumor can generally be felt by the vaginal finger as a tense, fluctuating mass, not adherent to the uterus. If it is movable, the motion is not imparted to the uterus.

DIFFERENTIAL DIAGNOSIS.—In all cases see that the bladder is evacuated: 1. From *Ascites*.—In ascites where the fluid is free to seek the most dependent portions of the abdomen, the shape of the abdomen varies as the patient changes her position. The abdomen of an ovarian cyst is always prominent whether the patient be standing or lying; the abdomen of ascites is convex when the patient is standing, concave when she is upon her back. In ascites percussion shows a center of tympany with a coronal dulness when the woman is lying; in the erect position, in ascites, the area of dulness is concave from below upward, *i. e.*, the minimum height of the dulness is in the median line, the curve of dulness gradually arising in the flanks; while in cystic tumors the area of dulness is convex from below upward, *i. e.*, the maximum height of dulness is in the median line and falls off with a rounded curve on either side. Two possible sources of error in percussion are: (1) cysts communicating with the intestine or those that have suppurated may contain gas and give a tympanitic note on percussion; (2) very tense cysts may give a tympanitic note, which is transmitted from the underlying or neighboring intestines. In such cases percussion should be made lightly.

2. From *Pregnancy*.—By the associated signs of pregnancy, fulness of the breasts, amenorrhea, etc.

3. From *Fibroid Tumors of the Uterus*.—By the history of menorrhagia; slow growth; nodular feel; their attach-

ment to the uterus ; the increased length of the uterine canal. Women with fibroids usually become more fat, and their complexion frequently is covered with patches of brown pigment.

4. From *Fibro-cystic Tumors of the Uterus*.—Difficult or often impossible. Only possible when other fibroid masses may be felt and their attachment to the uterus discovered.

5. From *Phantom Tumor or Spurious Pregnancy*.—By total resonance (absence of coranal resonance and center of dulness); loud intestinal gurgling is usually present. The abdomen may be pressed flat by distracting the patient's attention. An anesthetic will confirm the diagnosis. Phantom tumors occur usually in sterile women who have married late in life, or in women who have subjected themselves to illicit intercourse and fear the results.

6. From *Accumulation of Fat in the Abdominal Wall*.—This condition usually occurs at the menopause. By grasping a fold of the abdominal wall between the two hands the cause of the abdominal enlargement may be demonstrated.

PROGNOSIS.—Good, if properly treated; bad, if neglected. Death usually in two years.

TREATMENT.—Nothing but operation. Medical treatment is not only useless but dangerous, for it delays operative treatment. Electricity is as useless as medicine. Tapping is only palliative, and is often followed by great harm (peritonitis, hemorrhage, perforation of an intestine, peritoneal infection from escape of papillomatous contents, subsequent adhesions from localized points of inflammation). *Conditions in which tapping may become justifiable:*

1. When there are urgent pressure symptoms that cannot be immediately relieved by operation. 2. When for any reason operation is impossible. 3. When the cyst complicates pregnancy, in order to allow labor to take place.

Surgical Treatment.—Should be performed as soon as the diagnosis is made. Age is no contraindication; operate in a very young child or in an old woman. The size of the tumor does not influence the treatment; both large and small should be removed. Operate even if malignant degeneration or peritoneal infection be suspected. There

is but one *contraindication* to operation, and that is the coëxistence of some other pathological condition which will kill your patient even if the danger from the ovarian cyst be removed. *Steps of Operation.*—1. Incision in the median line between the umbilicus and symphysis pubis. 2. After exposing the cyst, pass the fingers or hand gently around it in order to determine the presence or absence of adhesions. 3. Tap the cyst with a trocar and draw off the contents. 4. Grasp the cyst-wall with forceps and drag it out, separating all adhesions and ligating those that are vascular. 5. Ligation of the pedicle with the figure-of-eight knot or with the Tait knot. Should the cyst be intra-ligamentous it must be enucleated bodily from its position. In some of these cases the broad ligament may be tied off in sections. Remove at this operation the opposite ovary if beginning cystic disease be detected in it.

SOLID TUMORS OF THE OVARY form about 5 per cent of the ovarian cases submitted to operation. They are far less common than the cystic varieties. *Varieties.*—(1) fibromata; (2) myomata; (3) sarcomata; (4) carcino-mata.

PATHOLOGY.—1. Fibrous tumors of the ovary are very rare. They do not form circumscribed new growth, like fibroids of the uterus, but are rather a fibroid degeneration of the whole organ, which is so uniformly hypertrophied that its shape and relations are not altered. *Size.*—Usually small, but may weigh as much as seven pounds; enormous when they undergo sarcomatous or myxomatous degeneration. *Corpora Fibrosa.*—Fibroids of the corpus luteum. Tough, opaque, fibrous bodies occasionally found in the ovary. Probably due to fibrous changes in the tissue of the corpus luteum. Usually small (split pea), but may reach the size of a hen's egg. *Degenerations.*—Calcification; myxomatous. 2. *Myomata.*—Composed mainly of unstriped muscular fiber, or a mixture of muscular and fibrous tissue (*fibro-myomata*). Not common, but more frequent than the pure fibromata. *Symptoms of Fibroids and Fibro-myomata.*—Ascites; rarely is there any pain; the presence on either side or posterior to the uterus of a large, hard body of an oval shape. 3. *Sar-*

coma.—Not common. The frequency of sarcoma of the ovary is about one per cent. in relation to cysts (*Cohn's statistics based upon examinations of Schræder's ovari-otomies*). Often mistaken for fibromata; very often bilateral (a diagnostic point between sarcoma and fibroma). The spindle-celled variety is more frequent than the round-celled variety. *Size*.—Usually medium; at times enormous. *Growth*.—At times very rapid. 4. *Carcinoma*. *Primary* cancer is very rare, if secondary cancerous degeneration of cysts be excluded. Usually cancer of the ovary is secondary, and due to metastasis from disease in some other portion of the body (cancer of the cervix or of the body of the uterus, cancer of the breast). *Treatment of Solid Tumors of the Ovary*.—Removal in all cases.

DERMOID TUMORS OF THE OVARY.—Cystic tumors lined by skin and its appendages. They occur in about three and five-tenths per cent. of all cases of ovarian cysts. *Age*.—They occur at all periods of life from infancy to old age. The amount of skin contained in dermoids varies greatly in different cysts. The following cutaneous appendages have been found in ovarian dermoids: hair, sebaceous glands, sweat glands, teeth, mammæ, horn, nail, bone, unstriped muscle, and tissue which is histologically identical with brain-matter. The hair is most frequent. It varies in length, color, and amount. A single tuft rolled into a ball and mixed with sebaceous matter is common; this may attain a length of twenty inches. The color is usually capricious, and, as a rule, differs from that on the exterior of the individual. It changes in color with age and eventually is shed. Sebaceous glands are numerous and very large in size; they are occasionally converted into retention-cysts by occlusion of their orifices. Sweat glands are not so frequent. The pultaceous or putty-like material which fills these cysts is a mixture of epithelial débris, secretions from the sebaceous glands, shed hairs, oil, and cholesterin. Bone is very often present, either in loose, ill-shaped masses, resembling in structure that found along the alveolar borders of the jaws, or as irregular, hard plates. Nipple-

like fragments of skin are common, and when present are beset with large sebaceous glands (*pseudo-mamma*). No ducts or gland-tissue occupy the substance of the mass. Occasionally horns are present and nail-like tissue. Teeth are present in a very large proportion of cases. In number they vary considerably (one or two to four hundred). As a rule, they are embedded in loose bone, like the alveolar margin of the jaw; they may project from the flat, bony plate, or may be loose in the cyst. The presence of teeth in number many times greater than that normally possessed by one individual is a strong argument against the theory of the origin of these tumors by diplogenesis or fetal inclusion. The existence of nerves in ovarian dermoids has not yet been satisfactorily demonstrated. *Metastasis of Dermoid Cysts*.—Rupture of an ovarian dermoid may be followed by general peritoneal infection. *Etiology*.—The origin of dermoid cysts is obscure. They were formerly ascribed to extra-uterine pregnancy, but this is absolutely wrong, for they may occur in infants. The most plausible theory is that of *impaction*. According to this view, during intra-uterine existence certain portions of the blastodermic structure of the embryo (from which the skin and its appendages are derived) become impacted by pressure within the tissues and develop there later, giving rise to an irregular formation of the normal tissues which should grow from this blastodermic layer. *Treatment*.—*Removal*.

DISPLACEMENT OF THE OVARY.—*Varieties*.—1. Hernia through the inguinal canal (*rare*). 2. Prolapse (*exceedingly common*).

Hernia of the Ovary.—*Varieties*.—*Congenital or acquired*; in the former case the ovary is found in the inguinal canal at birth. These are probably undescended testicles in cases of hermaphroditism. A microscopic examination should always be made when such “ovaries” are removed. In *acquired* hernia of the ovary, the organ occupies the sac of an inguinal hernia, either alone or with a knuckle of gut or piece of omentum. *Symptoms*.—Peculiar tenderness and nausea on pressure upon the tumor; increase in the

size of the tumor just before the menstrual flux. *Treatment.*—Reduction, if possible (*if adhesions do not exist*), and the retention of the ovary within the abdominal cavity by the application of a proper truss. If this is impossible the ovary should be removed.

Prolapse of the Ovary.—Displacement downward of the ovary without displacement of the uterus. *Etiology.*—1. Anything causing enlargement or increased weight of the organ (small cyst, simple congestion). 2. A sudden jar or fall, or a heavy lift. 3. Anything altering the normal buoyancy or specific gravity of the ovary. *Position Occupied by a Prolapsed Ovary.*—Usually a little to one side of the cervix and between the upper end of the vagina and the rectum. The *left* ovary is usually involved because the anatomic relationship of its veins renders it more liable to passive congestion. The *right* ovarian vein enters the inferior vena cava and at its termination in the cava is a very perfect valve, whereas the *left* ovarian valve empties at a right angle into the left renal vein, and is not provided with a valve. The absence of the valve on the left side, and the fact that the ovarian vein joins the main blood current to the heart at a right angle, predispose the parts which furnish blood to this vein to a state of passive congestion. Hence, hyperemia, congestion, and prolapse are much more common in the left than in the right ovary. *Symptoms.*—Mainly pain in locomotion, the ovary being pinched between the womb and the sacrum. The pain is referred to the inguinal and sacral regions, and is of a sickening character, lancinating and radiating down the corresponding thigh, along the track of the genito-crural nerve. Sudden jars or jolting will also cause this pain. There is also throbbing pain during constipation and agonizing pain during defecation. Dyspareunia or painful coition is also present, and occasionally a distressing condition of recurring orgasm. Depression of spirits with suicidal tendencies may follow. *Diagnosis.*—Easy by the presence of the tumor behind the cervix, or, if both ovaries are prolapsed, of two tumors. *Treatment.*—The ovary may be replaced if adhesions have not formed, but it is impossible to retain it in position. The treatment of ovarian prolapse then may be *palliative* or *radical* (removal

of the organ). The *palliative* treatment is applicable only to well-to-do women, those who can take rest when the organ becomes unduly congested or painful. Frequent vaginal injections of hot water may then relieve the congestion. Applications of tincture of iodine to the vaginal vault, the introduction of cotton tampons saturated with glycerin or boro-glycerid, the use of the knee-chest position two or three times a day, with relaxed clothing, the woman refraining from straining and breathing naturally, to favor displacement upward of the pelvic viscera (*Campbell's Treatment*). The woman should retain this position for a few minutes, and then slowly turn over on her side and lie in the Sims position as long as she can. It is well to advise the patient to adopt this proceeding immediately before retiring. The nozzle of a vaginal syringe introduced into the vagina will cause ballooning of the latter and further aid in the replacement of the prolapsed organ. *Radical* operation should only be done after careful consideration and discussion. It should be done : (1) when the pain is extreme ; (2) when the lesion of the ovary is accompanied by mental or moral affections (great depression, suicidal tendency, insanity) ; (3) when the woman is dependent for her existence upon her own labor.

RESULTS OF OVARIOTOMY, or the *Effects of Removal of both Ovaries on the Sexual Characters of Women*.—Certain definite important changes are brought about. A *modified* form of the menopause is produced. It brings about the menopause in so far as it stops menstruation, but in other respects the process following double ovariectomy and true menopause differ. The influence of this operation may be considered in its effects upon menstruation, personal appearance, the nervous system, and the sexual feelings.

1. *Menstruation*. Usually this ceases. Immediately after all cases of double ovariectomy a form of metrostaxis occurs. Blood issues from the vagina within forty-eight hours of the operation, and this lasts two days or less. In some cases irregular menstruation occurs for a period of a few months, and then stops entirely ; in other cases there is suppression after two or three periods. These irregularities cannot be considered as a persistence of menstruation

after removal of the ovaries. They may be due to the force of habit, or to some law of periodicity of which nothing is known. In some rare cases of double ovariectomy menstruation is not stopped. Some have ascribed this phenomenon to the existence of a third ovary, but these cases of so-called "third ovaries" are usually instances of deeply-fissured ovaries. It is a disputed question whether there is such a thing as an accessory ovary. It is probable that in these cases of persistence of menstruation some portion of the ovarian tissue or of the Fallopian tube has been left in the abdominal cavity. To avoid such an accident the tube should be ligated at the uterine cornua.

2. *Personal Appearance*.—It is now clearly demonstrated that double ovariectomy does not lead to any unusual development of a secondary sexual character in the voice, hair, figure, or emotions. The woman becomes, as a rule, better looking, and better nourished as a result of the relief of her previous suffering. There is not the tendency to the excessive deposition of fat unless such a tendency previously existed, neither is there a subsequent atrophy of the breast.

3. *Nervous System*.—After double ovariectomy most women suffer for one or two years with the distressing phenomenon called *flashes of heat*, or *flushes*, which is also characteristic of the normal *menopause*, or *change of life*. This phenomenon consists of a primary hot feeling, followed shortly by sweating, and this by cold or chilly sensations. These flushes may occur as often as ten times in an hour. In some rare cases the flushing begins within a week after the operation; in most, however, it is delayed some months, and in a few cases it may not occur until a year has elapsed. The only *treatment* consists in plenty of exercise in the open air, careful attention to hygiene, and the use of bromides, strychnine, and belladonna.

4. *Sexual Appetite*.—In most women this feeling is unchanged by the operation; in a few cases it does disappear after removal of the ovaries. In many women, the dyspareunia being removed, the sexual appetite, formerly lost, returns.

XII. The Bladder.

ANATOMY.—The bladder is a musculo-membranous sac situated behind the symphysis pubis. *Form.*—Varies with the age of the individual and the degree to which it is distended. In childhood the vertical diameter is the longest; in middle life the transverse; in old age, from the sagging of the inferior fundus of the bladder and a gradual atrophy of the pelvic organs, the vertical diameter again becomes the longest. When empty the walls of the bladder are closely coaptated, and the viscus assumes the general form of the letter Y. Moderately filled it assumes a somewhat ovoid shape, and rises slightly above the pubes. In extreme distention it may reach to the umbilicus, or even to the ensiform cartilage. The *body* is that portion which lies above the vesical openings of the ureters and the center of the symphysis pubis. The *base* or *fundus* is that portion lying below the plane in which these points lie. In the fundus is the *vesical triangle*, or *trigone*, a triangular space of which the vesical openings of the ureters and the vesical orifice of the urethra are the angles. The *bas fond* is that portion of the base lying just behind the openings of the ureters. It is most marked in males. The *cervix* or *neck* is the funnel-shaped space at the apex of the vesical triangle where the bladder and urethra merge into each other. The retentive power of the bladder is due, probably, not to a true anatomical sphincter, but to the loose, superabundant tissue about the neck, which falls together in a number of folds. At the base of the bladder two small muscular slips arise from the neck, and are inserted about the vesical openings of the ureters. These serve as guides in determining the point of entrance of the ureter into the bladder. The *mucous* coat of the bladder consists of a basement membrane supporting two or more layers of epithelium, in some parts squamous, in others cylindric. It is not closely attached to the subjacent muscular layer except at the vesical triangle, the neck, and about the orifice of the ureters. The color of the mucous membrane is a dull grayish-red when the bladder is undilated;

as dilatation proceeds, and the irregular folds are straightened out, it becomes gradually a brighter red, and the minute arteries may be seen as an interlacing network on the surface. The nerve supply to the vesical triangle is exceedingly rich; hence, this is the most sensitive part of the bladder. The vascular system of the bladder has extensive and intimate connection with the network of vessels found in the substance and upon the surface of the uterus. This fact explains the frequent coincidence and reciprocal influence of congestions manifested in the two organs. The ureters pierce the bladder-wall obliquely, and their openings lie on each side of the median line at the base of the bladder; they are so minute as to be hardly visible to the naked eye. Their points of entrance are marked by slight puckering in the mucous membrane. The internal urethral orifice is a diagonal slit at the junction of the vesical neck and the urethra. When the mucous membrane of the bladder is in a normal condition no absorption takes place to any extent; when abraded, however, absorption is rapid and its effects marked. A healthy woman urinates from four to six times in 24 hours, and passes in all an average amount of about 45 ounces of urine. The pressure within the bladder is increased about three times when the woman rises from the recumbent to the erect posture. Hence, the advantage of rest in the treatment of cystitis.

Vesical Measurements.—Of value in some of the more delicate methods of diagnosis, as, *e. g.*, catheterization of the ureters. The distance through which the ureter traverses the wall of the bladder is a half or three-quarters of an inch. The vesical openings of the ureters are situated at a point about the middle of the anterior vaginal wall. The vesical triangle is practically equilateral, its sides varying from one to one and a half inches in length. The orifices of the ureters, therefore, lie about half way down the anterior wall of the vagina, and from a half inch to three-quarters of an inch on either side of the median line. The distance between the urethral opening and the middle of the base of the vesical triangle, or the middle of the line drawn between the two orifices of the ureters is from

three-eighths to one and one-eighth inches. Each of these three orifices which lie at the angles of the vesical triangle is at the top of a papilla, which is more or less prominent, of an irregular cylindric form, made by a thickening of the muscular coat, and invested by mucous membrane. These papillæ serve as landmarks. The two orifices of the ureters are connected by a marked band formed of muscular tissue and a fold of the mucous membrane of the bladder. This band is convex forward. It is called the *interureteral ligament*, the *pad*, or the *muscle* of the ureter. It aids in locating the position of the orifices of the ureters in catheterizing the latter.

DISEASES.—Bladder symptoms, *frequent and painful micturition*, may accompany a vast number of conditions and yet be primarily unaccompanied by any cystitis or inflammatory condition of the mucous membrane of the bladder. Thus they may be present in retro-displacement of the uterus, inflammatory conditions of the uterus (*endometritis* and *metritis*), subinvolution, various diseases of the ovary, pelvic and abdominal tumors, pelvic inflammatory diseases (*salpingitis*, *tubal abscess*), laceration of the perineum, certain diseases of the rectum. All these conditions result in a disordered function of the bladder by altering the anatomic relations of this organ. Removal or cure of this primary lesion results in cure of the vesical trouble. Never diagnose the condition as cystitis until, first, a careful examination has been made of the external genitals, the perineum, and all the pelvic organs. Do not forget that many vesical derangements are due to an abnormal condition of the urine; such conditions must be excluded.

Diseases of the bladder are *functional* and *organic*. The *functional* diseases are those in which no pathologic lesion can be detected. They include the various disturbances which occur in nervous and hysterical women. They are benefited by general treatment, but local treatment is harmful. In great irritability of the bladder the administration of potassium bromide, opium, or belladonna is of advantage. A very useful prescription is the following: *R.* Atropin sulph., gr. ss; Aq. dest., ℥iv. *M.* *S.* Five

drops before each meal in a wineglassful of water. Malarial poisoning as a cause of bladder disease must be remembered. The disease is then called *malarial fever of the urethra*, and the symptoms are frequent desire to urinate, some vesical tenesmus, severe burning pain on passing water, stinging and burning in the urethra after urination. The suffering may be greatest in the afternoon and early part of the night. *Treatment*.—Quinine. Organic disease of the bladder requires local examination and local treatment.

EXAMINATION OF THE BLADDER.—Physical exploration of the bladder and urethra may be done digitally or with an endoscope. 1. *Digital examination per vaginam* is one of the most valuable methods, combined with the bimanual touch. The vaginal touch reveals the position of the bladder and urethra, the degree of sensitiveness, the location of tenderness, the increase or diminution of elasticity, the state of the walls as regards thickening or irregularity, the amount of distention of the bladder, and the presence of any foreign body. As a means of detecting stone in the bladders of women the abdominal touch is the easiest, safest, and surest of all methods of exploration. It may be used alone or combined with a sound introduced into the bladder. 2. *Digital examination with the finger introduced through the urethra*. The urethra must be dilated by graduated bougies or by the dilator. The dilator is introduced into the urethra through its whole length, and the blades are then opened gradually. Greater dilatation than one inch is not safe. *Danger*.—Subsequent incontinence of urine from failure of the overstretched urethral muscles to recover their original tonicity. 3. *Digital examination through an opening in the vesico-vaginal septum*. The opening is best made in the median line about half-way up the anterior vaginal wall; the ureters are thus avoided. 4. *Kelly's method by means of the endoscope*. Woman in exaggerated lithotomy or knee-chest position; urethra dilated 10 to 14 mm. under ether or cocain (10 per cent. sol.). Cystoscope is introduced and light thrown in from a head-mirror.

CYSTITIS.—Inflammation of the bladder. *Varieties*.—*Acute and chronic* (most common). It may be chronic

from the beginning, being gradually brought about by the continued action of some cause which produces irritation of the vesical mucous membrane. *Pathology.*—In the *acute* form the membrane is swollen, relaxed, and of a bright or deep-red color, from hyperemia. The surface is partially or entirely covered with a thick, tenacious mucus; there is exfoliation of the epithelium, and pus and loose cells are found in the sulci between the folds. In rare cases of acute cystitis following over-distention of the bladder exfoliation of the entire mucous membrane may take place. Over-distention will also cause damage to the ureters and kidneys. An over-distended bladder cannot be thoroughly emptied unless pressure is made upon the abdominal walls to drive the urine out of the renal pelvis and ureters. This pressure may best be made by placing a binder about the abdomen and gradually tightening it as the urine escapes. This will avoid the danger which sometimes follows the sudden removal of pressure from the abdominal blood-vessels (*syncope* and *death*), and it prevents regurgitation of air into the bladder, and thus subsequent decomposition of the urine. But half of the urine should be drawn off at once. In *chronic* cystitis, the membrane is of a muddy gray color, and is smeared in many places with a dark-yellow, muco-purulent secretion. As the disease advances patches of ulceration appear, with occasional, though slight, hemorrhages. There is thickening of the vesical walls from involvement of the submucous inter-muscular tissue. In cases of long standing the vesical ends of the ureters are obstructed by the swelling and hypertrophy of the bladder walls. This leads to dilatation of the ureters and of the renal pelvis. *Symptoms of Chronic Cystitis.*—1. *Local.*—Pain, tenesmus, and frequent urination. Micturition is followed by a desire to strain (tenesmus), as if the organ had not been fully emptied. In the more acute cases this gives rise to the most intense agony, the patient remaining on the vessel for hours at a time. The *urine* contains mucus, pus, epithelium, and blood-corpuscles. To determine whether the pus comes from the bladder or from the renal pelvis, first wash out the bladder and then introduce a catheter. In cystitis the

fluid will be clear, while in pyelitis or pyelo-nephritis it will contain pus. 2. *General*.—Often very marked. They are due to the poisoning of the general system from absorption of some of the ingredients of the urine through the bladder wall and by the renal disease or hyperemia which may be present. Ammoniaemia, urinemia, or septicemia may thus be produced. *Treatment*.—First ascertain the cause and remove it. The milder cases of vesical catarrh recover on the removal of the exciting cause and the administration of general internal treatment. Cases of greater severity require local medication to the bladder, while cases with pus in the urine and ulceration of the mucous membrane may require operation. *General Treatment*.—Saline purgatives are especially useful in this disease, as Rochelle salts $\mathfrak{5j}$ – $\mathfrak{3ss}$ in the morning upon rising, in a tumbler of Vichy water, or in solution in water; or sulphate of magnesia in peppermint water. The patient should be advised to drink large quantities of unirritating fluid, avoiding the use of malt and alcoholic liquors and highly seasoned food. The diet should be simple; a plain milk diet is best, the milk being raw, or boiled, or in the form of buttermilk. A gallon or two of milk may be taken in the twenty-four hours. As the disease improves solid food may gradually be taken. A useful diluent drink is flaxseed tea ($\mathfrak{3ss}$ of ground flaxseed steeped in a pint of water slightly below the boiling-point). Drugs to act on the mucous membrane of the bladder are eucalyptus, oil of turpentine, tannic acid, benzoic acid, salicylate of soda, and boracic acid. Benzoic acid is found to be useful in a very large number of cases. It often seems to act like a specific, giving speedy and permanent relief. It may be given in about ten-grain doses in an infusion of buchu three or four times a day. The benzoate of ammonia in the same dose is more palatable and more easily dissolved. Oil of turpentine in 1–5 minim capsules or on a lump of sugar is of service. Astringents, as tannic acid, often act beneficially when the pain is not severe and the urine contains mucus and pus. In irritability of the bladder or in mild cases of chronic cystitis *boracic acid* is very valuable. It is especially of

service in the irritable bladder following operations in which the use of the catheter was necessary. It should be given in doses of from ten grains to a dram three or four times a day. Some patients cannot take this drug. The symptoms which contraindicate its use are extreme anorexia, nausea, and general weakness. The drug may be given in powder form, dissolved in flaxseed tea (5ss-5j to a pint of the tea, the whole amount to be taken in the 24 hours), or in an infusion of buchu. *Rest* in the recumbent posture is essential in all cases, especially where the vesical irritation is at all acute. To allay annoying tenesmus and pain, bromide of potash in 20-grain doses three times a day, or suppositories of opium and belladonna may be required. *Local Treatment*.—Only to be tried when the general treatment alone has failed. *Washing out the bladder* is often of service. Certain *rules* must be observed. 1. The catheter should be sufficiently soft and flexible to avoid injuring the bladder or urethra. 2. It should be surgically clean. 3. The bladder should be emptied slowly, especially when withdrawing the last of the contents, otherwise it may be injured by contracting abruptly upon the instrument. 4. Instillations or injections into the bladder should be made very slowly. An ounce is sufficient in all cases, and much less will suffice if more gives pain. 5. *Apparatus*.—An ordinary glass funnel and a soft rubber catheter. A piece of rubber tube is attached to the funnel and the tube and catheter are joined by a piece of glass tube. This apparatus is used as a catheter in the first place to withdraw the urine, and then, leaving it in place, the cleansing solution is poured into the funnel, which is raised high enough to allow the fluid to flow into the bladder. By depressing the funnel the fluid will escape. This process may be repeated as often as is necessary. The entrance of air may be prevented by permitting the patient to retain a few drams of urine before beginning the treatment. When the catheter is introduced and the urine drawn off, enough of the latter will remain in the catheter to fill it. When once the process of washing is begun, the exclusion of air is easily managed by regulating the eleva-

tions and depressions of the funnel so that the catheter and tube will be kept full all of the time. 6. In introducing the catheter always make a visual examination of the parts and do not rely upon the tactile sense alone. Thus may be avoided the carrying into the bladder of septic matter from the vestibule. First render the meatus aseptic by washing with bichloride solution (1-2000). 7. Each woman should have her own catheter; one instrument should not be used in common. 8. *Substances used for Washing out the Bladder.*—Simple warm water is often beneficial. The addition of chlorate of potash or common salt makes it less irritating to the bladder. Borax or common table salt, about 60 grains to the pint of water, is very useful. 9. Having washed out the bladder, introduce the selected medicine, retain it for a few minutes, and then withdraw it. 10. The *substances* to be used. Astringent and alterative injections, as nitrate of silver, sulphate of zinc, tannic acid, acetate of lead, one or two grains of either to the ounce of warm water. Never give injections which are strong enough to cause much pain. In obstinate cases of cystitis a strong solution of silver nitrate (20 grains to the ounce) may be used, in amounts of not more than 5-10 drops, administered by Skene's instillation tube. If there is great irritability at night, so that rest is impossible, a permanent catheter may be introduced during the night. An ordinary soft rubber catheter retained by a fine silk ligature tied to the pubic hairs or Skene's self-retaining catheter may be used for this purpose. This method of draining the bladder at night saves the patient the distress of frequent rising to urinate, and relieves the inflamed condition of the bladder by placing the organ at rest. *Permanent Drainage of the Bladder.*—Necessary when the local treatment fails. Drainage is secured by direct incision through the anterior vaginal wall by the operation called *cystotomy*. A vesico-vaginal fistula is thus produced and distention of the bladder is prevented. This is preferable to the use of a self-retaining catheter, which must necessarily be a source of more or less irritation to the inflamed mucous membrane. This method may be used

primarily in cases of chronic cystitis with a large amount of pus in the urine and with indications of ulceration of the mucous membrane. *Method of Operating.*—The patient is etherized and in the Sims or dorso-sacral position. The anterior vaginal wall is exposed by means of a large-sized Sims speculum. A sound somewhat abruptly curved an inch and a half from its extremity should be introduced into the bladder and held by an assistant. The point of this instrument is firmly pressed in the median line against the base of the bladder, so as to make a projection into the vagina a little behind the neck of the bladder, and the projecting tissue on the vaginal surface is seized with a tenaculum and divided by scissors or bistoury directly on the point of the sound until it can be passed into the vagina. With the sound remaining in the opening as a guide, one blade of a pair of scissors should be passed into the bladder, and the vesico-vaginal septum be divided upward toward the cervix uteri in the median line. The object in cutting on the point of the sound is to secure corresponding incisions in the vesical and vaginal surfaces. In order to keep the vesico-vaginal fistula open, the mucous membrane of the bladder should be stitched to that of the vagina around the circumference of the opening, or a glass stud, shaped like a collar-button, should be introduced into the opening (*Emmet*). Having made the opening, the state of the bladder walls should be ascertained by introducing the finger. If there is much mucus or pus or phosphatic deposit in the bladder, it is desirable to wash out every day at first with ordinary warm water, or with a solution of boracic acid and warm water (5j–Oj). In ordinary cases washing is unnecessary. To prevent excoriation of the thighs and genitalia the parts should be well greased with some thick ointment, and the woman should constantly wear a perineal pad of some absorbent material. An apparatus to receive the urine may be worn (*Skene's urinal cup pessary*). Women undergoing this treatment need not be confined to bed, but they should rest as much as possible. After the cystitis has been cured the fistula may be closed.

FOREIGN BODIES IN THE BLADDER.—*Varieties.*—1. *Those that come from the body of the woman, entering the bladder by perforation* (various parts of the fetus, pieces of ulcerated intestine, masses of feces, fecal and biliary concretions, womb-stones). 2. *Those that have their origin in the bladder* (various forms of calculi). The causes of stone in the bladder are about the same in both sexes. There is, however, one cause which is present in woman that does not occur in man. In cystocele, where there is a prolapse of the base of the bladder, a mass of mucus or shreds of membrane and triple and amorphous phosphates gradually collect in this abnormal pouch and form a nucleus for stone. Stone also is apt to form after the operation for closure of a vesico-vaginal fistula. In some cases this stone is formed around one of the sutures which has penetrated the bladder-wall and formed a nucleus; in other cases the stone was pre-existent, and was the cause of the vesico-vaginal fistula by producing injury to the bladder-wall by being caught between the fetal head and the pubes during labor. The fistula being closed, the urine distends the bladder, the calculus is dislodged and provokes the characteristic symptoms of stone in the bladder. 3. *Those that are introduced from without through the urethra.* A most numerous and diverse list of substances may thus find their way into the bladder. Some of these may be forced into the bladder by accidents (falls or blows); others have been introduced into the urethra for the purpose of masturbation, and then pushed accidentally into the bladder.

Symptoms.—Vary with the size and shape of the foreign body and with the roughness of its surface. Frequent urination, tenesmus, pain before, during, and after urination; sometimes incontinence; always more or less cystitis.

Diagnosis.—Comparatively easy by the bimanual method combined with the use of the sound. *Treatment.*—Removal at once, and preferably by incision in the anterior wall of the vagina, beginning in the median line somewhat back of the vesical neck, and carried upward toward the cervix uteri far enough to permit extraction of the body. This may be left as a permanent fistula until all the symptoms of cystitis have disappeared, and should then be closed.

XIII. The Urethra.

ANATOMY.—The urethra is a musculo-membranous canal varying in length from one to two inches. Its diameter is greater than that of the male, being about one-fourth of an inch. It has a direction upward and backward, and at all times when normal its axis closely corresponds to that of the vagina. The epithelial covering of the anterior or lowest portion of the urethra is of the pavement variety, and closely resembles that of the vagina. The upper portion of the urethra has an epithelial covering like that of the bladder, consisting of columnar and squamous cells. It also contains a number of small mucous glands, and near the floor of the urethra, one on either side, are two tubules or glands (*Skene's glands*). Their orifices are situated near the meatus urinarius (about one-eighth inch within), and they extend from this point upward from three-eighths to three-quarters of an inch. They are large enough to admit a number one bougie of the French scale. In case of slight prolapse of the mucous membrane of the urethra, as in multipara, the openings of these glands are exposed to view upon each side of the entrance to the urethra. The *meatus urinarius* is, in women, a puckered and somewhat prominent opening. The mucous membrane of the urethra is thrown into longitudinal folds throughout. When at rest the urethra is a closed canal.

DISEASES.—1. *Urethritis*.—Inflammation of gonorrheal origin in the great majority of cases. *Symptoms*.—Painful urination; discharge; reddened condition of the meatus. Introducing the finger into the vagina, and pressing upon the urethra from above downward, the discharge can be pushed out. *Treatment*.—Internal administration of such drugs as copaiba, salol, sandal-wood; injections into the urethra, if necessary, of solutions of silver nitrate, zinc sulphate, etc. The injections can be administered through the ordinary pipette, and should be given by the physician. The urethra will not hold more than 10 to 15 drops. In cases of gonorrheal urethritis in woman the disease often lingers in Skene's glands; hence, the orifices of these glands

should be examined in each case to determine the presence or absence of chronic inflammation in them. Saline purgatives should be added to the treatment in all cases of urethritis.

2. *Granular Erosion of the Urethra.*—*Cause.*—Chronic inflammation of the urethra, resulting in this rare change in the lining membrane. *Pathology.*—Upon stretching open the meatus the mucous membrane is found highly congested, and apparently denuded of its epithelium (in fact, it is covered with young, imperfectly developed epithelium); the papillæ are hypertrophied and extremely sensitive. *Symptoms.*—Excruciating pain during micturition; tenesmus; tenderness on pressure over urethra. *Diagnosis.*—Most common in old people. The diagnosis is made from the history and the appearance of the urethra. *Treatment.*—Cauterization of the whole surface with pure carbolic acid, the application being repeated in eight or ten days. This treatment is best made through the urethral speculum (*French's*). Follow the application of the acid with one of olive oil. If this fails, dilate the urethra, either with graduated bougies or with the cervical dilator, and then touch with carbolic acid, very strong solutions of corrosive sublimate or of nitrate of silver.

3. *Vesico-urethral Fissure.*—*Fissure of the Neck of the Bladder.* This holds an intermediate position between cystitis and urethritis and may be mistaken for either of these conditions. *Etiology.*—It is generally caused by the urethritis; it may be produced by injuries during confinement, by displacements of the bladder, by the careless use of the catheter, or by careless injections into the bladder or urethra. *Pathology.*—A crack or linear ulcer of the mucous membrane running lengthwise of the urethra, and situated in one of the sulci or folds of the membrane formed by the corrugations which always exist when the urethra is not distended. As a rule, two-thirds of it is situated in the urethra, the upper end of it only extending into the bladder. Usually it is located on the right side of the circumference of the urethra anteriorly. It closely resembles in size and appearance fissure of the rectum. It is from a quarter to three-

eighths of an inch long and from one-twelfth to one-sixth of an inch deep in the center, but tapering off at each end. The deepest part of the fissure has a yellowish-gray color, while the edges are red and inflamed, abrupt, elevated, indurated. *Symptoms.*—Severe and continuous burning pain at the neck of the bladder due to the slight though constant pressure to which the fissure is subjected from its position, the presence here of many sensitive nerves, and the irritation of the urine; constant desire to urinate; the pain and burning are intense immediately after urination, but gradually subside, only to reappear as the urine accumulates. *Diagnosis.*—From *Cystitis and Urethritis.*—In *fissure* the pain is, as a rule, more circumscribed and more acute; urination in *fissure* is always followed by the maximum of pain, while in *cystitis* there is often a sense of relief after urination, and in *urethritis* the greatest pain is experienced during the act of urination, after which it subsides and is usually absent until the next evacuation of the bladder. *Cystitis* may be excluded by an examination of the urine. *Urethritis* may be excluded by an examination with the urethral speculum, the endoscope, and the presence of pus in the track. Vesico-urethral fissure can only be diagnosed with certainty by an endoscopic examination or by seeing it through a vesico-vaginal opening. *Treatment.*—Consists essentially in giving the parts rest. This can be done in one of two ways: 1. By forcible dilatation of the urethra with a cervical dilator (thus producing temporary paralysis of the muscles of the neck of the bladder). 2. Cystotomy, with the formation of a vesico-vaginal fistula (by continuously draining off the urine in this way the muscles and tissues at the neck of the bladder are given a rest). The latter operation is better for most cases, for an opportunity is also given to cure the cystitis that may be present. If this be not present forcible dilatation may be performed. *Danger of Dilatation.*—Permanent incontinence of the urine. The urethra cannot be safely dilated beyond an inch; it should not be dilated to a greater extent than will admit the end of the little finger. *Cystotomy.*—Lower end of the incision should be as close to the vesical neck as can

be done without involving it. While the speculum is still in position in the vagina, the edges of this incision in the anterior vaginal wall should be widely separated by means of two tenacula in the hands of assistants and the fissure sought by opening the folds of mucous membrane around the neck of the bladder. This examination is best made with a tenaculum, and is greatly facilitated by the use of a laryngeal mirror. When found, the edge of a scalpel should be drawn through the angle of the fissure. A few weeks' rest and the use of hot water injections will result in a cure. The vaginal incision should be allowed to close gradually, no sutures being introduced.

4. *Neoplasms of the Urethra.*—*Varieties.*—Papilloma; glandular growths, including cysts and mucous polypi; vascular growths, including angiomata, varices, phlebectases; fibroma; sarcoma; carcinoma; certain compound neoplasms, as papillary polypoid angiomata, or erectile tumors. *Papillomata.*—Growths of a low grade and of a warty appearance. *Surface.*—Bright-red or partially white from epithelial aggregation. Their growth is painless; they do not bleed; they may or may not be pedunculated, and may occur in clusters or singly. They may be entirely within the urethra or may project from the meatus. *Cysts.* Not uncommon, and not confined to any period of life (may be found in the fetus). In early age they are situated in the anterior portion of the urethra, but later in life they appear nearer the vesical neck. They often cause great obstruction to the free outflow of urine. They may become polypoid. *Cause.*—Usually occlusion of the orifices of Skene's glands. Frequently a black spot on the surface of the cyst indicates the seat of the former orifice. *Vascular Neoplasms.*—All of these growths are the same condition under different names. They are hemorrhoids of the urethra. *Cause.*—Increase in the caliber of the veins and venous radicles. They appear as bunches of worm-like, irregularly-distended, dark-blue, or bluish-red vessels. They are usually situated on the floor of the canal, but may occupy any part of the urethra. They are not sensitive or tender unless they protrude and become abraded. Their size varies from a pin-head to a hickory-

nut; they may be single or multiple, usually the former. Their color is pale to a bright-red; they may or may not be pedunculated. Their favorite *seat* is the posterior wall of the lower half of the urethra very near to or at the meatus. *Urethral Caruncle* is the most common form of this growth. It is a papillary polypoid angioma, consisting of bunches of dilated capillaries set in a moderately dense stroma of connective tissue, and covered with mucous membrane having a pavement epithelium. Occasionally it is erectile and becomes markedly increased in size at the menstrual period and when irritated in other ways. As a rule it bleeds easily on touch, and is exquisitely sensitive. Caruncle differs from hemorrhoid of the urethra in being composed of bunches of dilated capillaries (the hemorrhoid is merely a dilated vein or venous radicle) and in its extreme sensitiveness. *Symptoms.*—Caruncle is the only non-malignant neoplasm of the urethra that produces trouble, unless the other tumors be of large size, when they produce obstruction to the outflow of the urine. In the case of caruncle micturition is attended with intense pain, and patients retain their water for a long time to avoid the agony. The pain may be constant, and be aggravated by sitting or lying down. Coition is always intensely painful or even impossible. In the severe forms the patients become pale, emaciated, and low-spirited, and may commit suicide. *Diagnosis of Neoplasm of the Urethra.*—Easy on examination by the eye, touch, speculum, endoscope, and examination of the urine; the patient should be anesthetized if the tumor be sensitive. In some cases where the neoplasms lie deeply in the canal it is necessary to lay open the urethra through the vagina for purposes of diagnosis. *Treatment.*—Surgical. Removal of the growth with the bistoury or scissors after ligation. The base may be closed with sutures or cauterized with nitric acid, carbolic acid, or the actual cautery. If pedunculated and within easy reach, the tumor may be grasped in a polypus forceps and removed by torsion. *All the abnormal tissue should be removed to avoid recurrence.*

5. *Dilatation of the Urethra.*—Rare. The increase in the size of the urethra may involve the whole

canal, or it may be limited to a portion of it, which is most common, especially to the middle third. *Sacculated urethra; urethrocele.* The condition is really one of abnormal dilatability, and the extent to which this dilatation may occur is very great, even sufficient to permit of copulation *per urethram*. The urethral walls and the urethro-vaginal septum are relaxed and flabby at first, but after a considerable time they become indurated by infiltration or by hyperplasia of the connective tissue. The mucous membrane is soft and loosely adherent to the adjacent tissues. Occasionally beneath the membrane will be found masses of enlarged veins which give a dark bluish color to the parts. If the meatus be distended, the mucous membrane will protrude like a hemorrhoid; if the meatus remain closed, the dilatation can be detected only by introducing a sound which can be moved about in the urethra as in the bladder. The anterior wall of the urethra maintains its normal position, but the central portion of the posterior wall sinks, forming thus a triangular canal, with the upper wall the base and the central portion of the posterior wall the apex. *Cause of Urethrocele.*—Injury to the floor of the urethra (such as may occur during labor); some obstruction in the anterior portion of the urethra which impedes the flow of urine. It should be remembered that this form of urethrocele is quite distinct from that following laceration of the perineum and prolapse of the anterior vaginal wall. Etiologically this form is independent of any laceration of the perineum. *Symptoms.*—None characteristic. Frequent and painful micturition, and if a sacculated condition exist, in addition there is difficulty in micturition, which requires more voluntary effort on the part of the patient (*straining*). This straining produces irritation and hypertrophy of the bladder walls, and if the disease lasts long enough, pathologic lesions are produced in the ureters and kidneys. *Diagnosis.*—By the introduction of the sound into the bladder; on withdrawing it, it will sink into the urethral pocket. *Treatment.*—If due to stricture, this must be cured. If not due to this cause, make a fistulous opening at the most dependent portion of the urethro-

cele, and maintain this until inflammation of the urethral mucous membrane has been relieved, when it may be closed by a plastic operation. *Steps of Operation.*—Patient in the lithotomy position; introduction of a Sims speculum; median incision along the axis of the urethra immediately over the most dependent part of the urethral pouch; suture of the urethral mucous membrane to the vaginal mucous membrane to prevent too early closing. If there is a disposition to close too early, a very fine rubber drain may be passed through the meatus and the urethral fissure and the ends tied together over the vestibule. If the mucous membrane is redundant, it may be cut away either when the incision is made or when the fistula is closed.

6. *Dislocation of the Urethra.*—May be accompanied by or may be independent of displacement of the bladder. Generally it accompanies and is the result of vesical displacement. *Symptoms.*—Very similar to those of dilatation of the urethra. *Treatment.*—Repair of the injury which produces the dislocation.

7. *Prolapse of the Mucous Membrane of the Urethra.*—The prolapsed membrane presents at the external meatus, projecting from the upper or lower portion of the passage, or occupying the entire circumference of the canal. *Etiology.*—Anything producing continued congestion of the urethra and cystic irritation; debilitated conditions; not uncommon in old prostitutes. *Symptoms.*—Obstruction to the escape of urine; tenesmus; finally there is displacement and dilatation of the whole urethral canal, with edema of the tissues from obstruction to the circulation. If long continued, cystitis and death from renal disease will be the inevitable termination. *Treatment.*—Operative. 1. If the prolapse involves only the anterior portion of the canal gentle traction should be made on the redundant portion, which should then be cut off, and the internal edge of the membrane stitched to the edge of the meatus. 2. *Emmet's Operation (Buttonhole).*—A buttonhole is made through the urethro-vaginal septum, and the redundant mucous membrane is dragged through and excised. The patient is thoroughly anesthetized, and placed in the Sims or dorso-sacral position; a Sims speculum is introduced into the

vagina ; an incision is made in the median line over the course of the urethra down to the mucous membrane of this canal. The mucous membrane is then pressed through the incision by the point of a sound introduced into the urethra, and the redundant portion seized with a tenaculum or forceps and dragged out, a large sound being passed into the bladder in order to expand all of the folds of the mucous membrane. Sutures are then introduced through all of the tissues of the urethro-vaginal septum, the redundant membrane is cut off, and the opening closed by tying the sutures.

8. *Stricture of the Urethra.—Etiology.*—1. Usually gonorrheal in origin. 2. The deposit of inflammatory products beneath the mucous membrane which by gradual contraction constricts the canal. 3. Extensive ulceration of the mucous membrane. 4. Too free use of caustics. 5. Injuries during childbirth. 6. Bands of scar-tissue in the anterior vaginal wall stretching across the urethra. 7. Long-standing vesico-vaginal fistula with contraction from disuse. The most common clinical form is contraction of the meatus urinaris produced by the too liberal use of caustics in the treatment of abnormal growths at the lower end of the urethra, or by vulvitis. This form of stricture is the least troublesome and is easily relieved. *Pathology.*—When due to the results of former urethritis or peri-urethritis, the walls of the urethra are thickened and indurated at the point of stricture. Stricture is usually accompanied by a subacute urethritis, and at times by ulceration and dilatation of the urethra on the proximal side of the stricture. *Symptoms.*—Frequent and difficult micturition mainly. *Diagnosis.*—The use of the sound or of the olive-pointed bougie. *Prognosis.*—Good, unless the ureters have become dilated and the kidneys diseased. *Treatment.*—If at the meatus, divide by the urethrotome, or forcibly dilate. If due to bands of scar-tissue in the vagina, these should be divided at several points, and the urethra dilated by passing a sound. When due to the deposition of inflammatory products in the submucous tissues, forcible and rapid dilatation should be practised. This should be done carefully to avoid lacerating the mucous membrane. Great dilatation is not necessary.

The ordinary cervical dilator may be used, or graduated sounds. It is often impossible to cure the stricture, that is, to eradicate it; but it may be relieved and the woman freed from the annoying symptoms. There is often displayed a constant tendency to contract, and the occasional passage of the sound may be necessary throughout the life of the patient. In such cases the woman should be taught how to use the instrument herself, impressing upon her the necessity of extreme care and cleanliness.

9. *Diseases of the Urethral Glands (Skene's).—Varieties.*—(1) Catarrh, or subacute inflammation; (2) gonorrheal inflammation; (3) inflammation following vulvitis; (4) tuberculosis. *Gonorrheal Inflammation.*—Most important; not uncommon. It is generally of the chronic purulent variety, and in time extends from the mucous membrane of the ducts to the surrounding tissues. *Pathology.*—Early, there is a slight swelling of the lower portion of the urethra; the mouths of the ducts are larger than normal, and the surrounding tissues are congested. Pressure upon the urethra from above downward causes a free purulent discharge. The mucous membrane in the neighborhood of the ducts becomes thickened by proliferation of the areolar tissue and epithelium, and has an irregular papillomatous appearance, of a deep-red color. The lower third of the urethra is generally thickened and indurated from surrounding inflammatory infiltration. *Symptoms.*—Extreme tenderness to the touch; great discomfort in sitting and walking; occasional sharp, stinging pain; continual sense of heat in the parts; painful urination in some cases. *Treatment.*—Same as for tuberculosis of the glands.

Tuberculosis of the Urethral Glands.—This occurs only in women who are of the tuberculous diathesis, and may appear as a primary affection or be developed during the progress of tuberculous disease of the other organs of the body. *Etiology of Primary Form.*—Tuberculous semen; discharge from a tuberculous epididymitis, etc. *Pathology.*—Same as in gonorrheal inflammation, together with the accumulation of caseous material in the tubes and ulceration, which occurs in the more advanced stages of the disease. The ulceration takes place in the newly-formed tissue

in the walls and around the mouths of the tubules. Generally, a urethral inflammation accompanies this condition of the glands. In time the bladder and the kidneys become affected, all of the urinary organs becoming involved, unless the patient succumb before the disease has completed its progress. Occasionally polypi or papillomatous growths of small size are found along the urethra, due probably to inflammation of the mucous follicles and papillæ of the mucous membrane. *Symptoms.*—Same as for other forms of inflammation of these structures. Tuberculous disease of Skene's glands has very important significance in the fact that it *indicates the commencement of general tuberculosis* of the urinary organs. *Diagnosis.*—By exclusion of gonorrhea and vulvitis. *Treatment.*—Consists in freely laying open the ducts. The patient is placed on the left side; a Sims speculum is used to separate the labia and retract the perineum. The position and depth of the tubules having been ascertained, the probe-pointed blade of a very fine scissors is introduced, and the posterior wall divided through its entire length. To prevent union of the parts a small piece of cotton, saturated with persulphate of iron, should be packed in between the divided edges, or the glandular surface may be cauterized with carbolic acid or tincture of iodine.

XIV. Cicatricial Fistulæ of the Vagina.

VARIETIES OF FISTULÆ.—1. Those that give passage to urine. 2. Those that give passage to fecal matter. *Urinary Fistulæ.*—The *location* of the fistula, produced by labor, varies with the relations of the bladder and urethra to the superior border of the pubis at the time of labor, as the fistula is produced by pressure against this bony prominence. The walls of the uterus itself are never the site of the perforation from this cause, as the internal os always maintains a position above the pubic bone. The anterior wall of the cervix, however, may be perforated, though rarely (*vesico-cervical fistula*); ordinarily it is the vesico-vaginal septum that is perforated (*vesico-vaginal fistula*); finally, the bladder may

be retained above the pubis, the urethra being extended so that it is subjected to pressure and perforation (*urethro-vaginal fistula*). The ureters may be pressed between the child's head and the pubes, and a fistula of this structure result, the opening being either into the vagina (*uretero-vaginal fistula*) or into the cervical canal (*uretero-cervical fistula*). Simple uretero-vaginal fistulæ without simultaneous communication with the bladder are very rare. Most frequently the perforation of the ureter is secondary to a vesico-vaginal fistula. In the same way the uretero-uterine (cervical) fistulæ are but a variety of the vesico-uterine or vesico-cervical, in which, as a result of cicatricial contraction, the wounded ureter comes into contact with the cervix, which has been more or less injured, and communicates with the bladder.

Etiology of Fistulæ.—1. Difficult labor, which has produced sloughing of a more or less extensive portion of the genital canal. 2. Wound of the vesico-vaginal septum by the forceps. 3. Vesical calculus.

Vesico-Vaginal Fistula.—Most frequent variety of all fistulæ. The opening may be almost invisible, or it may appear as a red orifice, generally oval in form, and in direction transverse or oblique. Its edges may be flexible, or hard and sclerotic, and are formed by the union of the two mucous membranes. The orifice is, as a rule, single, but there may be several openings separated by cicatricial bands. In some cases the whole vesico-vaginal septum has been destroyed. *Symptoms of Urinary Fistula.*—Incontinence of urine. This first appears usually about the third or fourth day after labor, when the slough comes away. It may not appear for a month. The amount of urine lost is influenced by the position of the patient; *e.g.*, the urine would not flow through a fistula in the upper part of the vagina if the patient were in the erect posture until sufficient urine had accumulated in the bladder to reach the level of the fistulous opening. In the case of a urethro-vaginal fistula the urine is not discharged into the vagina until at the time of micturition, for in this case the vesical neck is still intact and retention is perfect. In the uretero-vaginal or uretero-uterine fistula the urine secreted by one

kidney accumulates normally in the bladder, while that secreted by the other filters away drop by drop into the vagina. Without care excoriation of the external genitals follows, involving also the buttocks and thighs. The labia may become the seat of deep ulceration, and occasionally of abscess. The mucous surface of the vagina is in part lost, and the abraded surface speedily becomes covered with offensive phosphatic deposit. If the loss of tissue has been extensive, the inverted posterior walls of the bladder protrude in a semi-strangulated condition. The bladder contracts from non-usage, as does also the urethra. *Diagnosis of Urinary Fistula.*—Generally easy, by digital and visual examination. The woman should be placed in the Sims posture, and the Sims speculum introduced. In a doubtful case milk may be injected into the bladder, and this will be seen issuing from the opening. In case of a *vesico-cervical* fistula the introduction of a sound into the bladder and a probe into the cervix may demonstrate the condition, the two instruments meeting in the cervical canal. In case of *uretero-vaginal* or *uretero-cervical* fistula, the urine should be drawn off from the bladder, the patient should be placed upon a vessel or bed-pan for two hours, and the urine passed by the vagina collected. At the end of that time the bladder should be catheterized, and if the two quantities of urine thus obtained are equal in amount the existence of a uretero-vaginal fistula will be demonstrated. *Diagnosis. From Cancer of the Cervix.*—In cases of long-standing vaginal fistula the cervix becomes the seat of chronic inflammation; it is hard, nodular, large, covered with ulcers resembling malignancy. Treat the fistula and this condition, if non-malignant, will disappear. *Prognosis.*—Only in exceptional cases will spontaneous recovery take place from cicatrization. Usually a permanent fistula is left. The curability by operation of the different varieties of fistula varies with their location, extent, duration, and the condition of the vaginal mucous membrane. *Treatment.*—Plastic operation.—*Time for Operation.*—Best between the sixth and eighth week after delivery. At this period the lochial discharge has disappeared, the slough has been eliminated, and the

margins of the fistula are sufficiently vascular and firm. *Preparatory Treatment.*—1. Removal of the offensive phosphatic deposit from the vaginal surface, by means of a soft sponge and frequent warm sitz baths with warm vaginal douches several times daily. Any raw spot should be brushed over with a weak solution of silver nitrate (5–10 grains to the ounce). 2. The urine must be kept in an acid condition by the following prescription: Benzoic acid, 2 5; borax, 3 5; water, 12 5. A tablespoonful of this should be given in water three or four times a day. After the urine has become acid the dose may be reduced to the smallest quantity that will maintain the acidity. Diluent drinks will render the urine less irritating. This plan of treatment may occupy many weeks, and should be pursued until the parts have attained a natural color and density. 3. All tension must be removed from the edges of the fistula by division of restraining cicatricial bands so that the edges may be readily approximated. The entire vaginal surface should be examined and the restraining bands snipped with a pair of blunt-pointed scissors. A Sims glass vaginal plug may then be introduced to prevent subsequent contraction. It should be long enough to put the canal well on the stretch, but not sufficient to produce sloughing or pelvic inflammation. The bleeding which follows this division of cicatricial bands is often excessive, but is generally controlled by the plug. The pressure of the plug will cause a remarkable absorption of the cicatricial tissue within a few weeks. *Steps of Operation.*—1. Patient, etherized, in the Sims or the dorso-sacral position. 2. Denudation of the edges of the fistula with curved scissors or a bistoury having a straight or angular blade. The denudation should begin at the most dependent part of the fistula, and the mucous surface should be removed in a continuous strip. The cicatricial tissue at the junction of the vaginal and vesical mucous membrane should be removed, but if possible the bladder should not be injured, for injury of this organ may produce such hemorrhage as to defeat the operation. Arrest hemorrhage during the denudation by twisting the vessel or by pressing the vesico-vaginal septum between two fingers; in severe cases pass a suture

from the vagina through the septum into the bladder, then across to some distance on the other side and out into the vagina again. (*Such a suture should be passed at a less distance than half an inch on either side of the median line, in order to avoid the ureters.*) For the success of the operation a broad surface should be obtained for union, the denuded surface extending from the fistulous opening a quarter or half an inch on to the vaginal wall, and being cylindrical or funnel-shaped, sloping from the vaginal mucous membrane to the mucous membrane of the bladder. The opening should be made more or less linear to avoid puckering in closing and the leaving of a fistulous opening. The fistula should be closed in such a direction as to produce the least tension on the sutures. If a choice exist, the line of union should always be extended in the long axis of the vagina to avoid downward traction on the uterus. *Suture Material.*—Silk, silver wire, silkworm gut, preferably the latter, shotted. The needle should be one of the various sizes of Emmet's needle and it should be armed with a double thread, the suture material being drawn through by passing it in the loop of the thread. The needle should be introduced about a quarter of an inch from the incision on the vaginal side and should emerge at the edge of the vesical mucous membrane, not including the latter structure. The needle grasps more tissue in the central portion of the vivified surface than at the edges, so that when the suture is tightened the opposing surfaces will make two straight lines in place of two concave lines. The suture should be drawn tight enough to insure perfect coaptation, but not so tight as to produce strangulation. If necessary a superficial row of sutures may be introduced. No dressing is required. The vagina should be kept clean by occasional antiseptic douches. A loose tampon of bichlorid gauze may be introduced into the vagina immediately after the operation and retained there for 24 to 48 hours. The after-treatment is very simple. The use of a permanent catheter after this operation should depend upon the degree of traumatism which has been done, as indicated by the size of the opening and the amount of denudation which has been made. In small

openings the water may be drawn every four hours. In larger openings and in those in which there is much tension on the sutures, it is safer to introduce a permanent catheter for one or more days after the operation. As a general rule, a catheter may be introduced for twenty-four hours, and after that the urine be drawn every four or six hours until the patient is able to void it herself. For this purpose a soft rubber catheter, held in place by attaching it to the pubic hairs, is the most convenient. It should be removed twice a day for cleansing. The bowels should be moved the second or third day with saline purgatives. The suture should be removed on the tenth day. The patient may get up in two weeks. Should slight cystitis follow the operation, boracic acid may be administered in 10–20 graindoses, three or four times daily. *Incontinence of urine* often persists a long time after complete union of the fistula. This is due mainly to loss of tonicity in the vesical sphincter and the muscular coat of the urethra, from disuse. *Treatment*.—Injections of strychnin, the hot douche, electricity, pessaries.

RECTO-VAGINAL FISTULA.—*Cause*.—Labor. Ordinarily due to an extensive rupture of the perineum, cicatrized inferiorly in the location of greatest depth, but leaving a perforation above. *Symptoms*.—The passage of gas and fecal matter, especially marked when diarrhea is present. *Dagnosis*.—By digital and visual examination, the patient in the Sims posture. If necessary, a rectal injection of milk may be given, and this escaping through the fistula will complete the diagnosis.

Preliminary Treatment.—Thorough purging, and one hour before operation a rectal injection. A sponge should be introduced into the rectum above the seat of operation. Bichlorid douches should not be given, to avoid the danger of poisoning. *Treatment*.—Operation through the vagina, rectum, or perineum. The usual, and best way is through the vagina. *Method of Operation*.—Patient in the dorso-sacral position. The blade of a Sims speculum is introduced and pressed against the pubis. The denudation is made with scissors or bistoury, and should be carried to a considerable depth; the lining of the fistulous tract

should be dissected out. The denudation is funnel-shaped with the large end in the vagina. The sutures should underlie the denuded surface, but should exclude the rectal mucous membrane. In severe cases where the parts cannot be brought together in this way, the edges of the fistula should be split on each side, to a depth sufficient to permit the edges of the rectal wall to be brought together below, leaving the vaginal opening to be filled by granulations. *Operation through the Rectum.*—Dilation of sphincter ani, patient in the Sims position, and a Sims speculum introduced into the rectum. The denudation, and introduction of the sutures are done from the rectal side, as above. *Perineal Operation.*—Necessary when the fistula is situated directly against the sphincter ani, because, in consequence of the constant contraction of the muscle, good union cannot be obtained. In such a case the perineum and sphincter must be divided directly through the fistula with scissors; the sides of the fistula are then freshened and the case treated as for laceration of the perineum. The bowels may be opened on the third or fourth day, by calomel 5 grains, followed in the morning with a saline. The sutures should be removed about the tenth day; the patient may get up in two weeks.

COMPLICATED FISTULÆ.—In large fistulæ it is not best to attempt the closure of the whole opening at one sitting. In cases where sufficient denudation cannot be made on the vagina, the edges of the fistulæ may have to be split in order to obtain a sufficient raw surface for coaptation. *Treatment of Vesico-uterine or Vesico-cervical fistulæ.*—Split the cervix in the median line through the vaginal junction; lay open the track of the sinus; dissect out its walls, and close as for lacerated cervix, passing the sutures deeply beneath the course of the sinus. *Inaccessible fistulæ, i. e.,* those high up in the bladder. *Treat* by making a fistula back of the vesical neck in the median line. The urine will be constantly drained through this, and none passing through the upper fistula, the latter will close; the lower opening may then be closed in the usual way (*Penrose*). *Uretero-vaginal fistulæ.*—Plastic operation if practicable; if not, removal of corresponding

kidney. *In case of a fistula which cannot be influenced by any direct method*, COLPOCLEISIS, or closure of the vagina, has been resorted to. It consists in making an annular denudation as high up in the vagina as possible and uniting the two sides by suture. By this operation the uterus, bladder, and vagina are made to form one large urinary receptacle. *Objections.*—1. Impregnation and complete coition are impossible. 2. The accumulated menstrual blood causes vesical catarrh. 3. The irritation of the urine produces endometritis and salpingitis. 4. Phosphatic deposits take place in the vaginal pouch. 5. Ureteritis and pyelonephritis follow, with ultimate death.

XV. Gonorrhea in Women.

Less frequent than in males, since germs are deposited in the vagina; the urethra is not so exposed. Occurs in about 12 per cent. of gynecologic cases. Women can affect men and yet not suffer themselves, *i. e.*, present no symptoms. *Site* in order of frequency: 1. Urethra; 2. Cervical canal; 3. Vulva; 4. Periurethral and vulvovaginal glands; 5. Vagina.

1. URETHRA.—Disease may be limited to this period of incubation two to five days. *Symptoms.*—Frequent micturition with burning; mucopurulent discharge from urethra; tenderness on pressure over course of urethra. Course same as in male; lasts but a few weeks, if properly treated; if neglected, persists for years. Infectious at first; not so later. Examination shows dilated meatus, pouting mucosa, and orifices of Skene's glands may be seen.

2. CERVIX.—Danger is extension to body of uterus, tubes (pyosalpinx), ovaries, and peritoneum. Difficult to treat in chronic stage, since it lurks in distal ends of racemose glands. *Symptoms.*—Not marked; little or no pain; slight yellow or bloody leukorrhea. *The absence of the gonococcus does not exclude gonorrhea.*

3. VAGINA.—Very rare. Most common in young girls. In acute stage affects only the lower third; in chronic stage lurks in vaginal fornices (*gonorrhea of the fornices*), especially the posterior, in red, eroded, granular spots. Gonorrheal warts may be noted.

4. VULVA.—Not common save in young women. There is swelling, inflammation, purulent discharge, great pain, and burning. Patient cannot sit or walk.

5. PERIURETHRAL AND VULVOVAGINAL GLANDS.—A drop of milky fluid may be pressed from the mucous glands of the vestibule. Inflammation of Bartholin's glands is very rarely traumatic in origin (*bride's abscess*). In chronic inflammation the discharge is not always purulent; it may be thin, watery, and yet contain the gonococci. The orifices of the ducts of Bartholin's glands are surrounded by a small red ring (*gonorrheal macule of Snger*), which of itself is not a certain sign of gonorrheal infection.

DIAGNOSIS OF GONORRHEA.—Gonococci, if present, are conclusive evidence. Examine external meatus for a purulent discharge (the most common symptom of gonorrhea in women); then the small glands of the vestibule for a purulent discharge; then the vulvovaginal glands for the macule; then the cervix for a discharge containing gonococci; then the vaginal fornices (woman in knee-chest posture) for red areas.

TREATMENT OF GONORRHEA.—1. *Urethral*.—Often no local treatment necessary. Diet. Laxatives, cubebs, copaiba, sandalwood oil, frequent sitzbaths and vulvar washes; in chronic cases turpentine internally. Symptoms disappear in seven to ten days. If discharge persists for one month use urethral injections (10–15 minims), by means of a pipette or urethral syringe, of 1–2 grain solutions of silver nitrate, sulphate of copper, or sulphate of zinc, or 1–10,000 bichlorid solution. Inject once or twice daily. Iodoform bougies may be introduced. Continue local treatment until all symptoms disappear. 2. *Glands*.—Vulvar washes. Cauterize with lunar caustic, zinc chlorid, or carbolic acid. Incise and evacuate abscesses of Bartholin's glands. 3. *Vulva*.—Frequent cleansing washes of plain warm water, boracic acid solution (5j to the pint), or bichlorid solution (1–4000). For inflamed labia apply on lint an ointment of boracic acid (20–30 grains to the ounce). 4. *Vagina*.—Use douches of bichlorid solution (1–4000); frequent sitzbaths; saline purges. In acute stage use

weaker solutions (1-10,000). In the chronic stage make direct local applications to the red areas; cleanse first the spots with cotton and bichlorid and then apply silver nitrate (5-20 grains to the ounce). 5. *Cervix*.—Difficult to treat. In the acute stage use vaginal douches. In two or three weeks dilate slightly the external os without ether, and apply to the canal the same substances used in the urethra. In some acute cases applications of carbolic acid are valuable. 6. *Gonorrheal affections* of the upper portion of the general tract require operative (mutilating) procedures.

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